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ABSTRACT

This report supplies summary statistics for 70 health occupations in 35 different health fields. The data was collected from such sources as educational programs, places of employment, and records of certification, licenses to practice, registration, and association memberships. In 1967 there were 34 million persons in health occupations. There were 305,500 physicians, 98,700 dentists, and 659,000 registered nurses and the remainder were in allied health occupations which required either specialized education or on-the-job training. This report is divided into seven different parts. The first two discuss how to measure the supply of health manpower and the sources of manpower statistics. The other five consider the health manpower situation in medicine, dentistry, nursing, pharmacy, and hospitals and nursing homes. (BC)

VITAL and HEALTH STATISTICS
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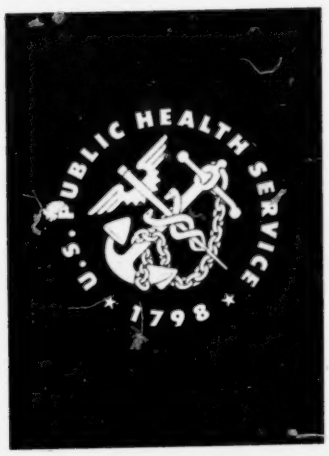
NATIONAL CENTER For HEALTH STATISTICS
Series 14
Number 1

Health Manpower

United States - 1965 - 1967

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
Public Health Service



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NATIONAL CENTER For HEALTH STATISTICS | Series 14 Number 1

ED035770

VITAL and HEALTH STATISTICS
DATA ON NATIONAL HEALTH RESOURCES

Health Manpower

United States - 1965 - 1967

Statistics on persons employed in selected health occupations, 1965 and 1967; recent statistics on physicians, dental manpower, nursing manpower, and pharmacists in relation to location, type of practice, and/or specialty; occupational statistics on persons employed in hospitals and in nursing homes, 1966; and discussion of sources of health manpower statistics.

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Health Services and Mental Health Administration

Washington, D.C. November 1968

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IN THIS REPORT summary statistics are presented on persons employed in 1965 and 1967 in about 70 health occupations, or combinations thereof. The occupations are grouped within 35 health fields.

Health manpower statistics are provided through such sources as educational programs, licenses to practice, certification, registration, association membership, places of employment, and other miscellaneous identifying factors.

The 3.4 million persons in health occupations in 1967 included more than 1 million physicians, dentists, and registered nurses. The numbers of workers in each of these three basic careers increased about 6 percent between 1965 and 1967.

The allied health occupations comprised the balance of 2.3 million persons with specialized education or on-the-job training that prepared them for functioning in the health establishment. These occupations accounted for 69 percent of the designated health workers in 1967.

Between 1965 and 1967 the allied health occupations gained almost one-half million workers. The largest gains were in nursing manpower—practical nurses, and aides, orderlies, and attendants—and in secretarial and office personnel.

Physician statistics are considered in terms of physicians' services as evidenced in present records, changes in classification of activity and specialty, and development of special surveys.

Estimates of dentist manpower and of dental auxiliaries are provided, along with a discussion of the national data compilation system.

Nursing manpower data are available through decennial censuses, interagency estimates, and inventories of registered nurses. Measurement of the nurse supply is considered in relation to size of the field, geographic distribution, employment diversity, and functional differences.

Pharmacist statistics based on State registrations are shown according to residence, activity status, sex, education, age group, type of practice, and employment in community pharmacies and in hospital pharmacies.

The occupations of the professional and technical workers employed in hospitals and in nursing homes in 1966 are reported from a special survey. Estimates of present shortages of hospital manpower were obtained at that time.

SYMBOLS

Data not available	---
Category not applicable	...
Quantity zero	-
Quantity more than 0 but less than 0.05	0.0
Figure does not meet standards of reliability or precision	*

MEASURING THE SUPPLY OF HEALTH MANPOWER

Maryland Y. Pennell, M. Sc.[a]

The 95th annual meeting of the American Public Health Association (APHA) was the occasion for the delivery of a group of papers concerned with "Measuring the Supply of Health Manpower." The speakers assembled on October 22, 1967, at Miami Beach, Florida, at a session sponsored by several sections of the Association—Statistics, Dental Health, Medical Care, and Public Health Nursing—and the Conference on Community Health Planning. This publication has been prepared in response to suggestions that the papers be printed in one volume, in order to reach a larger audience than the 150 persons who attended the session.

Plans for the APHA meeting were developed in the Health Manpower Statistics Branch of the National Center for Health Statistics (NCHS). Within the Public Health Service, NCHS has the responsibility for conducting statistical studies using primary and secondary sources to determine the numbers, geographic location, age, and other characteristics of health manpower in various fields. Hence this publication provides factual information on health manpower resources from other programs of the Service as well as national professional agencies. Reference is also made to other government and nongovernment agencies.

Each speaker was asked to provide information on the current number of persons active in the particular field and their location by State; growth in employment in recent years; and distribution by type of practice, function, and/or specialty. These statistics form the background for the discussion of problems involved in measurement of supply. The papers were not intended to discuss projections of manpower to be available in the future, measures of health manpower needs, utilization of health services, or demand therefor.

Following the APHA meeting, the speakers were given the opportunity to revise their papers for publication and to include later statistics. The article on physicians, for example, includes data as of December 31, 1967; that on dental manpower, as of mid-1967. Information from the 1966 inventory of registered nurses and the 1966-67 inventory of pharmacists was not available by March 1968, although both surveys of licensed personnel are nearing completion.

Measuring the supply of manpower must take into account several variables. For each health occupation there is the matter of *definition;* this affects who is counted, particularly when there are poorly defined categories or redefined titles that switch numbers from one category to another. In a particular occupation the supply depends on the number of persons who receive the appropriate *education or training* that qualifies them for functioning in that field.

The supply may be influenced by subsidizing training, by changing admission requirements, or by other means, thus bringing it to the level of one's expectations. The supply available for any field is also a function of the number of persons who can be drawn in from *related fields.* *International migration* is another factor in de-

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termining the supply of manpower in several of the health occupations. These variables are considered in the discussions for each specific health field.

Health manpower may be measured in two ways, by industry and by occupation. The U.S. Bureau of the Census reports that the "health services industry" at the time of the 1960 census employed 2.6 million persons in the civilian labor force, ranking third among some 70 industries.[1] Between the 1950 and 1960 censuses, the number of workers in the health services industry increased by almost 1 million, for a growth rate of 54 percent. About two-thirds of the individuals employed in this industry have education and training unique to the health field. The other third—almost 1 million workers—are clerks, craftsmen, laborers, and others who themselves assist in the provision of health services but whose skills are not limited to the health establishment.

The classification by "health occupations" focuses on those individuals possessing knowledge and skill unique to the health field. Included are health manpower in all industries, not just health services; for example, relatively few pharmacists and veterinarians are counted by the Bureau of the Census as being in the health services industry. The health occupations that are identified in table 1 suggest the range and diversity of health careers. Recognition of other supportive personnel—many in newly developing work areas—would greatly increase the number of occupations, to a labor force of approximately 4 million workers.

Physicians, dentists, and registered nurses comprise more than 1 million active health personnel. Between 1965 and 1967 each of these basic careers increased about 6 percent in numbers of workers, as shown below:

Occupation	*1965*	*1967*
Physician (M.D. and D.O.).....	288,700	305,500
Dentist.....	93,400	98,700
Registered nurse.....	621,000	659,000
Allied health occupations.....	1,837,700 to 1,858,000	2,312,100 to 2,347,400

In addition to these three careers, there are more than 2.3 million persons with education and specialized or on-the-job training that had prepared them for employment in the health establishment in 1967. The allied occupations accounted for 65 percent of the designated health workers in 1965 and 69 percent of the total in 1967.

Between 1965 and 1967 the allied health occupations gained almost one-half million workers—a tremendous increase of 26 percent. The largest gains were 300,000 nursing aides, orderlies, and attendants; 50,000 secretarial and office personnel; and 38 000 practical nurses. As many as 5,000 or more additional workers were estimated for such occupations as clinical laboratory technologists, clinical laboratory technicians-assistants, food technologists, home health aides, pharmacists, and radiologic technologists-technicians-assistants.

Allied health personnel function in comprehensive community health services, including hospital care, preventive medicine, and environmental protection. More than half of these health workers are accounted for in the professional and technical staffing of hospitals and nursing homes discussed in the last paper of this collection. Approximately one-fourth of the total have education to at least the baccalaureate level.

Many of these categories of allied health personnel have emerged since World War II, in order to provide a wide range in auxiliary services. At the same time there has been increasing specialization within many of the older disciplines in an effort to cope with the depth and thoroughness essential for optimum health care. The trend of diversification and specialization may be expected to characterize health manpower of the future.[2]

It is obvious that there are serious shortages in the supply of health manpower as well as inefficient use of some persons active in the health field. Maldistribution of facilities and services adds to the problem of rendering care to every member of our society. Attempts have been made toward measuring these shortcomings, but none of the many estimates can adequately measure the total need or demand. Even if one could envision the ideal staffing for health services for a community, for a State, or for the Nation, the continuing development of new knowledge and techniques, new patterns of service, and new methods of payment are all constantly

changing the needs for both numbers and varieties of health workers.

Nevertheless, opportunities for increasing the health manpower supply exist through adding to school capacities and attracting recruits to the health field. In addition, through improvements in wages and working conditions, employment can be made more attractive in order to retain persons currently in the labor force and to return to practice inactive health personnel. Action, study, and experimentation can help produce an adequate supply of well-qualified health workers.

Table 1. Estimated persons employed in selected occupations within each health field: 1965 and 1967

Health field and occupation	Workers	
	1965	1967
Total[1]	2,840,800 to 2,861,100	3,375,300 to 3,410,600
ADMINISTRATION OF HEALTH SERVICES	31,500 to 37,000	39,000 to 44,000
Administrator, program analyst, program representative	31,500 to 37,000	39,000 to 44,000
ANTHROPOLOGY AND SOCIOLOGY	600 to 800	1,000
Anthropologist - cultural and physical	400	600
Sociologist - medical	200 to 400	400
AUTOMATIC DATA PROCESSING IN THE HEALTH FIELD	300	500
Systems analyst	300	500
BASIC SCIENCES IN THE HEALTH FIELD	47,000	52,000
Research scientist (other than physician, dentist, veterinarian)	[2]47,000	52,000
BIOMEDICAL ENGINEERING	7,500	9,000
Biomedical engineer	2,500	3,000
Biomedical engineering technician	5,000	6,000
CHIROPRACTIC AND NATUROPATHY	16,000 to 18,000	16,000 to 18,000
Chiropractor, naturopath	[2]16,000 to 18,000	[3]16,000 to 18,000
CLINICAL LABORATORY SERVICES	85,000 to 95,000	100,000
Clinical laboratory scientist	3,500	4,000
Clinical (medical) laboratory technologist[4]	35,000	40,000
Clinical laboratory technician and aide	46,500 to 50,000	56,000
DENTISTRY AND ALLIED SERVICES	223,400	235,700
Dentist	[5]93,400	98,700
Dental hygienist	[2]13,500	[6]15,000
Dental assistant	91,000	95,000
Dental laboratory technician	25,500	27,000
DIETETIC AND NUTRITIONAL SERVICES	36,000	36,000
Dietitian and nutritionist	30,000	[3]30,000
Dietary technician, food service supervisor	[2]6,000	6,000

See footnotes at end of table.

Table 1. Estimated persons employed in selected occupations within each health field: 1965 and 1967--Con.

Health field and occupation	Workers	
	1965	1967
ECONOMIC RESEARCH IN THE HEALTH FIELD	500	500 to 600
Economist - health	500	500 to 600
ENVIRONMENTAL CONTROL	35,000	35,000
Environmental engineer	9,000	[3]9,000
Industrial hygienist	2,300	[3]2,300
Other environmental program specialists	8,700	[3]8,700
Sanitarian and sanitarian technician	15,000	[3]15,000
FOOD AND DRUG PROTECTIVE SERVICES	16,500	21,500
Food technologist	15,000	20,000
Food-and-drug analyst and inspector	1,500	1,500
HEALTH AND VITAL STATISTICS	1,400 to 2,400	2,400
Health statistician, vital-record registrar, demographer	1,400 to 2,400	[3]2,400
HEALTH EDUCATION	16,700	19,800
Public health educator	1,700	1,800
School health educator, coordinator	15,000	18,000
HEALTH INFORMATION AND COMMUNICATION	3,500 to 4,500	4,500
Health information specialist and science writer	1,000 to 2,000	[3]2,000
Health technical writer	[2]2,000	[3]2,000
Medical illustrator	500	[3]500
LIBRARY SERVICES IN THE HEALTH FIELD	8,000	8,000
Medical librarian	3,000	[3]3,000
Medical library assistant	5,000	[3]5,000
MEDICAL RECORDS	33,000	37,000
Medical record librarian	[2]10,000	12,000
Medical record technician	[2]23,000	25,000
MEDICINE AND OSTEOPATHY	288,700	305,500
Physician (M.D.)	[5]277,600	294,100
Physician (D.O.)	[5]11,100	11,400

See footnotes at end of table.

Table 1. Estimated persons employed in selected occupations within each health field: 1965 and 1967--Con.

Health field and occupation	Workers	
	1965	1967
MIDWIFERY	5,700	4,700
Lay midwife	[2]5,700	4,700
NURSING AND RELATED SERVICES	1,409,000	1,791,000
Registered nurse	621,000	659,000
Practical nurse	282,000	320,000
Nursing aide, orderly, attendant	500,000	800,000
Home health aide	6,000	12,000
OCCUPATIONAL THERAPY	10,000	11,000 to 12,000
Occupational therapist	6,000	6,500
Occupational therapy assistant, aide	[2]4,000	4,500 to 5,500
ORTHOTIC AND PROSTHETIC TECHNOLOGY	3,300	3,500
Orthotist and prosthetist	3,300	3,500
PHARMACY	123,000	128,000
Pharmacist	[2]117,400	122,400
Pharmacy aide	[2,7] 5,600	[7]5,600
PHYSICAL THERAPY	17,000	19,000 to 21,000
Physical therapist	12,000	13,000
Physical therapy assistant, aide	[2]5,000	6,000 to 8,000
PODIATRY	7,600	8,000
Podiatrist	7,600	8,000
PSYCHOLOGY	9,000	9,000
Psychologist - clinical, counseling, and other health	9,000	[3]9,000
RADIOLOGIC TECHNOLOGY	70,000	75,000 to 100,000
Radiologic (X-ray) technologist, technician	70,000	75,000 to 100,000
SECRETARIAL AND OFFICE SERVICES IN THE HEALTH FIELD	200,000	250,000
Secretary, office assistant	[2]200,000	250,000

See footnotes at end of table.

Table 1. Estimated persons employed in selected occupations within each health field: 1965 and 1967--Con.

Health field and occupation	Workers	
	1965	1967
SOCIAL WORK	19,000	21,700
Clinical social worker	17,500	20,200
Clinical social work assistant	[7]1,500	[7]1,500
SPECIALIZED REHABILITATION SERVICES	5,300 to 5,900	8,600 to 8,800
Corrective therapist	700 to 800	1,000 to 1,200
Educational therapist	500	[3]500
Manual arts therapist	900	[3]900
Music therapist	1,500	2,000
Recreation therapist	1,600 to 2,000	4,000
Homemaking rehabilitation consultant	100 to 200	200
SPEECH PATHOLOGY AND AUDIOLOGY	14,000	16,000
Speech pathologist and audiologist	14,000	16,000
VETERINARY MEDICINE	22,500	24,200
Veterinarian	[5]22,500	24,200
VISION CARE	40,400	40,400
Optometrist	17,000	[3]17,000
Optician	8,000	[3]8,000
Vision care technician	15,000	[3]15,000
Orthoptist	400	[3]400
VOCATIONAL REHABILITATION COUNSELING	6,200	7,800
Vocational rehabilitation counselor	[2]6,200	7,800
MISCELLANEOUS HEALTH SERVICES	28,200	34,000
Inhalation therapy technician	[2]5,000	7,000
Electrocardiograph technician	[2]5,000	6,000
Electroencephalograph technician	1,200	2,000
Surgical aide	[2]17,000	19,000

[1]Each occupation is counted only once. For example, all physicians are in medicine and osteopathy.

[2]Estimate not previously published or revised from that shown in PHS Pub. No. 1509.

[3]1965 estimate repeated in absence of sufficient information on which to base revision.

[4]With bachelor's degree or ASCP certified.

[5]Estimates revised to show active rather than total for dentist, physician, and veterinarian.

[6]Preliminary estimate.

[7]Limited to hospital employees in 1966.

Source: U.S. Department of Health, Education, and Welfare; Public Health Service, National Center for Health Statistics: Health Resources Statistics: Health Manpower, 1965. Public Health Service Publication No. 1509. Washington, D.C., U.S. Government Printing Office, 1966. (1967 data based on 1968 edition of this publication, now in process.)

SOURCES OF HEALTH MANPOWER STATISTICS

Siegfried A. Hoermann, B.A.[b]

An evaluation of the sources of health manpower statistics may be concerned with specific sources or references or with a more general approach. This paper is structured according to the latter, with examples of the former. Otherwise, a fairly large spectrum of specific sources has to be covered within a very limited space. In addition, I am concerned with issues of health manpower supply—current and future—rather than with issues of health manpower needs. The emphasis is on sources of national statistics, rather than on the myriad of sources and studies which pertain to specific State or local areas only.

The identification and classification of sources are rendered difficult by a number of factors. Basic to the problem is the identification, as such, of health manpower occupations as distinct from occupations not related to health. Furthermore, the rapidly changing technology and systems for the delivery of health services have had an attendant and continuing proliferation of health occupations and functions within given occupations. One end of the broad range of health occupations is represented by persons who deliver health services directly to the population, such as physicians, dentists, and nurses. At the other end are those with an indirect, but nevertheless important, role in the total system for the delivery of health services, such as medical record librarians, sanitarians, and selected computer programmers. By 1965, the number of health occupations as measured by primary titles had reached at least 140 which are listed in *Health Resources Statistics: Health Manpower, 1965.*[3]

In addition to the differing skills required for persons in each of these occupations, there is also a wide range in the control which society exercises over these practitioners. Some are rigidly controlled and identified through State laws and regulations as in the case of physicians and pharmacists; others are unregulated except by laws which apply to everyone. Subsets of society, such as professional associations, also exercise varying degrees of control over their members. Clearly, the sources of manpower statistics can more easily be identified for the regulated than for the nonregulated occupations.

Once the health occupations have been identified, there are several potential methods for obtaining information about them. One approach might be through household or establishment surveys or censuses. These censuses or surveys, while undoubtedly excellent sources of data on economic activity, are not necessarily good sources of health manpower statistics. For one thing, many of these types of surveys are based on samples which, even if large, are often not large enough to provide needed data and geographic distribution for many of the 140 health occupations.

In household surveys, there is the additional problem of response errors because the respondent, often the housewife, is frequently unable to describe adequately the specific work activity of household members. This is particularly serious in differentiating among the highly specialized health occupations. In this way, for example, the

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orthopedic surgeon, the podiatrist, the optometrist, and the chiropractor may all be reported as "doctors."

More accurate or consistent occupational classifications may be achieved in surveys of establishments, providing the categories used are broad enough to fit the records available to the surveyed establishments. The resulting categories, however, may be so broad as to preclude the needed differentiation of health occupations. Furthermore, establishment surveys fail to cover the independent practitioners who fall outside the purview of establishment records. Both the household and establishment surveys are usually concerned with work activity rather than with usual occupation or training. Administrators engaged in health planning may need information on the trained reservoir as well as on active practitioners.

For these reasons, we should also look elsewhere for sources of manpower statistics which will provide the necessary detail as regards fineness of occupational breakdown, geographic detail, and characteristics of both the active and the reserve health manpower. One of the initial steps in this pursuit is the identification by name, and location by address, of the members in the group to be studied. The development of such name-address lists, directories, or registries serves the double function of (1) being a source for developing simple counts of an occupation by geographic area and (2) providing the necessary mailing or field enumeration lists for more detailed surveys of given occupations.

Let us first consider the sources for developing or obtaining such name-address lists. Some of these sources may, in addition, provide other useful data over and above merely name and address. If the occupation is licensed in all States by law, as in the case of some 11 health occupations, names and addresses may be obtained from the official State licensing agencies. If the occupation is licensed in some but not all States, as is true for 14 additional occupations, other techniques would have to be used to obtain names and addresses for nonlicensing States.[4]

For some health occupations, specialty boards have been established to pass on qualifications and competency and to register or certify persons who meet established standards. Name and address lists may be obtained from these boards. Professional association membership lists may also be used as a source of names and addresses. For some occupations, however, the number of competing associations or their regional character may make further processing impracticable. For occupations which require specialized curricula or special schools, lists of graduates can be useful in identifying and locating those practitioners.

Commercial addressing companies or list houses may obtain their data initially from State licensing agencies, specialty boards, professional associations, schools, or other basic sources. These companies thus become a good source of names and addresses for selected occupations. Other sources of name-address lists include city directories and the classified sections of telephone books.

Use of the above-described sources raises the problem of ensuring complete coverage without duplication of practitioners in a given occupation for a specified period of time. For the occupations requiring a license to practice, the problem is primarily with practitioners who are licensed in two or more States. Such cases occur where a person is licensed both in the State where he graduated from professional school and in the State where he now practices. In addition, many persons practicing in the border areas of a State are also licensed in the neighboring State or States. The treatment by computer or clerk in including or excluding names which may have been variously recorded for the same person or are identical but for different persons may result in duplicate counts or omissions.

For occupations less universally recorded, multiple sources of the types described above must be used to obtain a comprehensive list. Thus the problem of coverage and duplication becomes more serious, since some members of an occupation may be registered, listed, or otherwise noted in several sources, while others are included in none.

As discussed earlier, most household and establishment surveys which are broad in scope are not particularly good sources of health manpower statistics, but they, together with selected administrative reporting systems, may also be useful as sources of name-address lists. Some

examples of these potential sources include the Internal Revenue Service returns which carry name, address, and occupation. The returns or address lists for the Censuses of Business and of Governments identify the places of work of many health practitioners. The National Science Foundation has developed biennial lists of scientists, many of whom are in health fields. The Bureau of Labor Statistics has questionnaire returns from its surveys of employment in State and local governments. The forms involved in the administrative functioning and in the surveys of the Social Security Administration might also be processed to provide lists. Records of the Naturalization and Immigration Service, including visas issued and annual alien registration would also be a potential source for obtaining name-address lists of selected foreign-born persons in the health occupations. This source could be particularly important for measuring total physician strength, including the large number of alien physicians in the country.

Some private organizations have conducted surveys of health personnel which involved name and address lists. For example, the American Medical Association conducts an annual survey to obtain current data on work status and specialization.

One problem, of course, is that the surveys or reporting systems usually are administered under assurances of confidentiality and even name-address lists may not be released. Secondly, the health occupations or employment in the health services industry may lack the definitional precision required for adequate health manpower statistics. In addition, there is the problem of response errors. For these and other operational reasons, it may be difficult to develop a system for separating the desired names and addresses for health personnel from the non-health occupations and industries. In some cases, it may be necessary to include borderline groups to ensure complete coverage of the desired health field.

Often no one list will cover a given occupation or occupational group completely. When this situation occurs, enough combinations of lists, either overlapping or mutually exclusive, must be used to achieve the minimally acceptable level of coverage, after removal of duplicates and nonapplicable cases. The level attained by this method may be determined by proper quality control procedures.

These name-address lists, whether obtained from State licensing agencies, specialty boards, membership lists, graduation lists, list houses, city directories, generalized household surveys, or administrative records, may provide basic frequency and geographic distribution statistics and possibly other information. Probably equally important is their role as mailing lists to obtain detailed information about the practitioner and his practice. Once a list has been established and evaluated as relatively complete, it can then form the basis for a detailed census or a sample survey of a health occupation. If these surveys are to be recurring, the mailing lists may be either reestablished as required or kept current.

The sources described above may provide statistics on the nature of the *current* supply of health occupations, including numbers and distribution from name-address lists and detailed characteristics from surveys based on these lists. There is also a source for providing statistics on estimated future supply. This is school records for those occupations with a fairly rigidly prescribed and specialized course of training or education, such as in the schools of dentistry, medicine, optometry, pharmacy, podiatry, and veterinary medicine. Attrition rates applied to student enrollment at various levels for these types of schools will yield short-range projections of increments to practitioners already in a given profession. Available age-specific death rates may be used to determine the corresponding losses. Longer range projections involve assumptions regarding the probable numbers of high school or university students who will enter given professional schools. Probably no long- or short-term projection techniques would be valid for occupations involving limited or on-the-job training or for those involving rapidly changing functions.

Because of the dynamic nature of health occupations and deficiencies in many of the above-described sources, great care must be exercised in the use and development of health manpower statistics. The Public Health Service, as part of its cooperative program with professional associations, is continuing its efforts to improve the quality and expand the coverage of statistics on health manpower.

PHYSICIANS

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Because doctors of medicine and osteopathy play an important role in the production of health care services, there is considerable emphasis placed on physicians in the study of health manpower. The physician's traditional role includes not only the performance of examinations and diagnostic, surgical, and therapeutic procedures but also the coordination or management of health care services provided by others. When physicians coordinate other health care services, they may be regarded as "middlemen" charged with purchasing services on behalf of the consumers who lack the knowledge required to make such decisions. Herbert Klarman correctly has pointed out that "physicians are called members of the health team, but their preeminence as its leaders is unchallenged, whether the task is patient care, research, planning, or administration."[5]

The double role which the physician has played in the health care industry must be considered in the study of physician supply, for physicians are not sought for themselves but for the services which they provide. The main reason for measuring the supply of health manpower is to determine whether it meets certain demand criteria. In this context the examination of past and future demand for health care services is unavoidable, lest we treat this subject in the traditional manner of merely counting the number of physicians and comparing this number to the number of people that they may be servicing. Physician-population ratios may be useful in the study of certain aspects of manpower. The use of such ratios alone, however, is not adequate since they do not reflect most of the factors which determine the demand for and supply of health care services.

DETERMINANTS OF DEMAND AND SUPPLY

During the past 20 years American consumers and government agencies have diverted increasing amounts of their annual budgets toward the purchase of health care services. Some of the factors which have contributed to the rise of demand are population growth and changes in its age and race distribution, increased education and sophistication regarding health, and the ability of the medical profession to provide more and better services. Of more importance, however, are factors which have enabled buyers to translate their wants into demand. Among these factors are rising disposable personal income, widespread health insurance coverage, and expanding government subsidies. When consumer income was low, at almost a subsistence level, health care was something of a luxury. Now with greater spending power, the consumer has accepted health care as a necessity.

Faced with this growing demand, the health care industry responded with an expansion of output. The number of hospital beds was vastly increased, the output of the drug industry increased five-fold, and the number of physicians exceeded 300,000. The health care industry became the third largest employer in the economy.

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The transition has been difficult since supply had to increase during a time when the United States economy was at high employment.

Given high employment, it was inconceivable that supply could increase without significant increases in cost. But cost increases could not have been translated into price increases unless enough consumers and government agencies were able to buy the additional output at constantly rising prices. Thus, pressures of demand against supply have been the critical factor in producing price increases. All evidence seems to support the thesis that the industry, or at least major segments of it, did not expand "fast enough." Rapidly increasing prices were the result, especially for those components the supply of which tends to be rigid and which require highly trained medical and allied health personnel. To economists, the term "rapidly increasing prices" is synonymous with an imbalance between supply and demand. Today, there are very few who argue that the present supply of health personnel and particularly of physician services is adequate.

Because this shortage of physicians has developed over a long period of time, we need not devise intricate methods to measure supply and demand in order to confirm the magnitude of the imbalance. There are enough indicators which substantiate its existence. Elton Rayack[6] arrives at an operational definition of this shortage on the basis of the rapid climb of physicians' incomes, increases in physicians' fees, and the search for less costly substitutes for their services, i.e., services of personnel with less training and experience. To these indicators we may add the long waiting lines of prospective students who wish to enter medical school.

The problem that we are faced with today is how to increase the capacity of the health care industry and stabilize prices for health care services. Two approaches may be used to achieve this end: first, increase the number of physicians and, second, expand the productivity of existing manpower. It is necessary to do both if the supply of health services is to meet the growing demand. It should be noted, however, that the latter can be a long term approach involving the evaluation and, to some extent, the reorganization of the present system.

MEASURING PHYSICIANS' SERVICES

Methods are needed to measure changes in (1) the supply of physicians and (2) their productivity. The first calls for a master file on physicians with demographic, biographical, and professional activity information. The second calls for special surveys of the physician population for the collection of utilization and financial data by type of practice organization for the study of productivity.

The remainder of this chapter discusses methods which the American Medical Association has adopted to meet the above two requirements for measuring the supply of physicians' services and describes the Association's data gathering efforts. Although this discussion centers on doctors of medicine, it can be applied to doctors of osteopathy. Tables 2-6 at the end of this chapter present numbers, distribution, type of practice, and specialty of physicians—M.D. and D.O.

Physicians' Records Service

A master file on M.D.'s has been maintained by the Physicians' Records Service of the American Medical Association for many years. It has included information on every physician in the United States and on those graduates of American schools who may be practicing overseas on a temporary basis. The file includes members and nonmembers of the Association. It also includes aliens residing in this country. Inclusion in the file starts during the medical school phase of a physician's career or upon his entry into the country. The master file is divided into two sections: (1) the current records of professional activities and (2) the historical records. The current records are computerized with a closing date of December each year, and tabulations are prepared which are published in the *Distribution of Physicians, Hospitals, and Hospital Beds in the U.S.* This series presents the number of Federal and non-Federal physicians by specialty, activity, and location. Comparable data are available starting with the year 1963.

The historical records are currently being computerized. They will comprise an additional

source for manpower studies when they become available for analyses in 1969. Among the more important information included in the historical records are: place of birth; previous professional addresses and licenses; and year and location of postgraduate training, i.e., internships and residencies, including fields of specialization. Such data will facilitate studies of geographic mobility and specialization trends in medical practice.

Reclassification of Physicians' Records

Since 1965 the AMA Department of Survey Research has been engaged in efforts to update, improve, and expand the existing information in the current records of professional activities. As part of this pursuit, consideration was given to the recommendations of the United States National Committee on Vital and Health Statistics, published in PHS Publication No. 1125, *United States Statistics on Medical Economics*. It is generally agreed that, in order to provide a satisfactory description of the role of physicians in the production of health services, the following information should be available:

1. geographic location, age, and sex
2. specialty (primary, secondary, and tertiary)
3. professional activity (full-time and part-time) including patient care
4. type of practice organization (solo, partnership, associate, group, other)
5. employer and mode of remuneration

A review of available studies conducted by the Association and an examination of the systems and methods used by the Physicians' Records Service disclosed that the records meet quality standards with regard to age, sex, geographic location, and employment information. However, six important limitations of the present system were noted:

1. the existence of categories which are not mutually exclusive, resulting in a confusion between activity, specialty, and employer classes
2. lack of a criterion upon which to base classification
3. the necessity for the respondents to choose unique categories for themselves, especially without a criterion for selection
4. the questionnaire used for compiling the master records did not provide a functional or operational breakdown of activities—patient care, training, administration, medical teaching, and research
5. the date of the most recent update of each individual record is not known
6. the response rate for the annual verification is not known

The elimination of the limiting factors in the present system will increase the validity and reliability of physicians' records and facilitate the classification of manpower into more functional categories. This calls for the development of a new system for the reclassification of individual records. Such a system is currently being implemented by the Association. It was developed after extensive consultations with the National Center for Health Statistics, the Division of Demographic Surveys of the Bureau of the Census, and many organizations using physicians' records.

A new questionnaire has been adopted for the annual verification of physicians' professional activities (exhibit A). The "Record of Physicians' Professional Activities," as it is called, is divided into three discrete sections—professional activities, specialization, and present employer. Mutually exclusive categories have been developed within each of these sections, and definitions are provided wherever necessary to aid respondents.

The number of hours spent during a typical week of practice is the criterion adopted for measuring activity status of physicians. This criterion was chosen as more suitable for more response, rather than other measures such as income or number of patients seen. The respondent will enter the number of hours in all applicable categories, and the final classification will be done through computer editing instructions. This procedure will eliminate most arbitrary decisions by the physicians or the AMA staff.

Finally, followup procedures have been instituted to raise the response rate of the annual survey. The record of each physician will be dated to reflect the last update of his file or the last substantial change in either his activity, specialty, or employment status.

Thus, additional information is being gathered for the accurate classification of each individual in more functional categories. Information will be available by December 31, 1968, on the number of hours which physicians spend in as many as 7 types of activities, 3 specialties, and 10 employers. This is more information than has ever been available on professional activities. At present we know only what physicians wish to designate as their primary and secondary specialties, their primary activity, and only their primary employer.

The new system will identify physicians engaged in direct care of patients. "Direct care" means seeing patients, but it also includes patient services by such M.D.'s as pathologists and radiologists. The majority of the physician population (including interns, residents, those in office practice, and full-time hospital staff) fall into this category. "Full-time patient care equivalents" will also be developed from those physicians primarily engaged in other activities, such as teaching, research, or administration, but who also see patients.

Pilot Study Results

A study was conducted to test the above recommendations and the proposed questionnaire. Questionnaires were mailed to a simple random sample of 4,994 physicians. Of these 40 were undeliverable, leaving an effective sample of 4,954. By the cutoff date, 4,494 (90.7 percent) usable responses had been received which were then machine edited. They resulted in 4,274 (86.3 percent) acceptable records which form the basis for all tabulations. The results of this study bear out the need for a criterion for classification if the records are expected to describe the fields of medicine in which physicians are actually practicing. The pilot study has demonstrated that it is possible to distinguish between activity and employer, or place of activity, and that the "number of hours spent during a typical week" is an appropriate criterion for classification.

Changes in activity classification.—A one-for-one comparison between the activity carried in the master file and that reported in the questionnaire is not possible because (1) the questionnaire distinguishes between activity and type of employer and (2) the questionnaire includes activities which were not previously recorded. All possible activity comparisons between the two systems, projected to the total physician population as of December 31, 1966, are presented in table 5.

Projections to the total physician population, on the basis of the pilot study results, show a marked decline (60.0 percent) in the number of physicians in "medical teaching." Many of those who were previously classified as teachers, because they were employed by medical schools, will now be classified in other activities (e.g., research, administration, and patient care), on the basis of the number of hours they spend in each activity. "Medical research" and "administration" show increases of over 100 percent. Substantial increases are also noted in the number of interns and residents.

An attempt was made to estimate the change in the number of physicians in patient care, although such a category has not been a part of physician records. This comparison is further complicated by the existence of the "full-time hospital staff" as an activity category in the records and a type of employer on the new questionnaire. Some of these physicians indicated, on the new questionnaire, patient care as a primary activity, while others indicated research, administration, or other activities.

Changes in specialty classification.—Comparisons were made between specialty as recorded in AMA records at the time of sampling and specialty as listed on the new questionnaire. A one-for-one comparison was possible in this section, although the physicians were given the additional choice of a third specialty. Three basic comparisons were made: specialty in AMA records and that designated in questionnaire, specialty designated as primary in the questionnaire and that with the most hours, and primary specialty in AMA records and that with the most hours on the questionnaire.

Only the comparison between the master file and the specialty with the largest number of hours reported on the questionnaire is shown in table 6. A few categories showed decreases, notably unspecified, general practice, and otolaryngology. The net decrease in the number of general practitioners may be due to the general tendency toward increased specialization. The decrease in the number of physicians whose specialty was unspecified is the result of more physicians responding to the specialty question rather than leaving it unanswered.

Net increases of more than 1,000 physicians were noted in the number of obstetricians and gynecologists, ophthalmologists, and orthopedic surgeons. The increase in the number of physicians (3,754) who reported specialties not recognized by the Association further confirms the general tendency toward specialization. Such specialties will be reviewed for possible inclusion in future tables on the distribution of medical practice.

The Periodic Survey of Physicians

The Periodic Survey of Physicians (PSP) was initiated in 1966 by the Department of Survey Research for the conduct of special studies to gather information on (1) the number of patients that physicians see in the office, hospital, and other locations; (2) the reasons for which patients visit physicians; (3) special procedures performed; (4) the hospital affiliations of physicians; and (5) their years of practice, hours worked, annual income, operating expenses, and fees. The ultimate goal is to query physicians on methods used to treat approximately 10 conditions, representative of most conditions for which the public seeks care. Such information, gathered over several years, will aid in establishing an index to measure changes in patterns in medical care.

The first PSP was conducted between February and May 1966, and results have been published.[7] The second PSP was conducted between September 1967 and January 1968, and the third PSP took place in the spring of 1968. Data from these surveys will be analyzed by type of medical practice organization. In this manner differences in the productivity of physicians will be measured.

SUMMARY

The present imbalance between the supply and demand for physicians' services can be corrected by increasing the number of physicians and expanding the productivity of existing manpower. In order to estimate the amount of increase in numbers and to evaluate the relative merits of different systems of health care, it is necessary to measure the supply of physicians and their services. To do so we must have (1) data on the number of physicians by specialty, activity, and type of employer and (2) data on the utilization of physicians' services and on changes in their productivity. The AMA has embarked on a program to obtain this information by expanding its master file and through the development of special surveys. When this information is available, those who set policy will have more facts on which to base objective decisions, and the profession will be able to reappraise the traditional role of the physician in the health care production process.

Table 2. Physicians in relation to population: selected years, 1963-67

Year[1]	Population in thousands	Number of physicians[2]			Physicians per 100,000 population
		M.D. and D.O.	M.D.	D.O.	
	Total[3]	All physicians, active and inactive			
1967	203,704	322,045	308,630	13,415	158
1966	201,585	313,559	300,375	13,184	156
1965	199,278	305,115	292,088	13,027	153
1964	196,858	297,089	284,224	12,865	151
1963	194,169	289,188	276,475	12,713	149
	Civilians	Non-Federal physicians providing patient care[4]			
1967	199,783	260,296	249,273	11,023	130
1966	197,662	254,396	243,333	11,063	129
1965	195,833	250,208	239,262	10,946	128
1964	193,612	244,542	233,772	10,770	126
1963	190,892	237,673	227,027	10,646	125
	Civilians	Non-Federal physicians proving patient care in office-based practice			
1967	199,783	200,146	190,079	10,067	100
1966	197,662	197,214	187,100	10,114	100
1965	195,833	195,334	185,338	9,996	100
1964	193,612	192,978	183,076	9,902	100
1963	190,892	189,267	179,449	9,818	99

[1]All data as of December 31.

[2]Includes non-Federal physicians in the 50 States, District of Columbia, Puerto Rico and other U.S. outlying areas (American Samoa, Canal Zone, Guam, Pacific Islands, and Virgin Islands); those with addresses temporarily unknown to the American Medical Association; and Federal physicians in U.S. and abroad. Excludes physicians with temporarily foreign addresses.

[3]Includes civilians in 50 States, District of Columbia, Puerto Rico and other U.S. outlying areas; U.S. citizens in foreign countries; and the Armed Forces in U.S. and abroad.

[4]Includes those in solo, partnership, group, or other forms of office practice and those in hospital-based practice--interns, residents, fellows, and full-time hospital staff.

Sources: A.M.A. Department of Survey Research: Distribution of Physicians, Hospitals, and Hospital Beds in the U.S., 1967: Regional, State, County, Metropolitan Area. Chicago. American Medical Association. 1968. Also prior reports.

A.O.A. Membership and Statistics Department: A Statistical Study of the Osteopathic Profession, December 31, 1967. Chicago. American Osteopathic Association. June 1968. Also prior editions.

U.S. Bureau of the Census: Population estimates. Current Population Reports. Series P-25, Nos. 238, 272, 273, 283, 324, 327, 358, 383, 386, and 392.

U.S. Department of State: Annual Report on U.S. Citizen Personnel and Their Dependents - as of March 31, 1967. Also prior reports.

Table 3. Location of non-Federal physicians in relation to population: December 31, 1957

Location	Civilian population in thousands, July 1	Non-Federal physicians, active and inactive[1]				Non-Federal physicians providing patient care[2]			
		Number			Rate per 100,000 civilians	Number			Rate per 100,000 civilians
		M.D. and D.O.	M.D. only	D.O. only		M.D. and D.O.	M.D. only	D.O. only	
All locations--	198,649	292,661	279,418	13,243	147	[3]260,296	249,273	[3]11,023	131
United States----	195,669	290,420	277,177	13,243	148	258,279	247,256	11,023	132
Alabama----------	3,505	2,871	2,867	4	82	2,621	2,619	2	75
Alaska----------	238	177	173	4	74	164	162	2	69
Arizona----------	1,606	2,347	2,068	279	146	2,015	1,790	225	125
Arkansas----------	1,958	1,710	1,688	22	87	1,520	1,505	15	78
California---------	18,793	34,555	34,135	420	184	30,345	30,204	141	161
Colorado----------	1,927	3,685	3,425	260	191	3,235	3,013	222	168
Connecticut--------	2,912	5,422	5,367	55	186	4,776	4,735	41	164
Delaware----------	515	727	686	41	141	671	635	36	130
Dist. of Columbia--	793	3,023	3,007	16	381	2,521	2,509	12	318
Florida----------	5,902	9,447	8,841	606	160	7,443	7,006	437	126
Georgia----------	4,389	4,558	4,478	80	104	4,097	4,034	63	93
Hawaii----------	684	1,002	982	20	146	913	898	15	133
Idaho----------	695	676	639	37	97	622	598	24	89
Illinois----------	10,825	14,996	14,652	344	139	13,525	13,313	212	125
Indiana----------	4,989	5,158	4,960	198	103	4,682	4,516	166	94
Iowa----------	2,752	3,298	2,889	409	120	2,892	2,566	326	105
Kansas----------	2,255	2,680	2,483	197	119	2,388	2,228	160	106
Kentucky----------	3,142	3,168	3,129	39	101	2,825	2,795	30	90
Louisiana----------	3,622	4,095	4,083	12	113	3,715	3,704	11	103
Maine----------	958	1,238	1,031	207	129	1,086	935	151	113
Maryland----------	3,606	6,374	6,351	23	177	5,481	5,466	15	152
Massachusetts------	5,387	11,195	10,913	282	208	9,762	9,584	178	181
Michigan----------	8,564	12,643	10,541	2,102	148	11,180	9,590	1,590	131
Minnesota----------	3,577	5,414	5,351	63	151	4,851	4,802	49	136
Mississippi--------	2,320	1,768	1,767	1	76	1,604	1,603	1	69
Missouri----------	4,565	6,832	5,677	1,155	150	5,859	5,030	829	128
Montana----------	691	726	686	40	105	673	645	28	97
Nebraska----------	1,423	1,717	1,670	47	121	1,511	1,479	32	106
Nevada----------	437	477	449	28	109	437	415	22	100
New Hampshire------	681	964	938	26	142	813	797	16	119

See footnotes at end of table.

Table 3. Location of non-Federal physicians in relation to population: December 31, 1967—Con.

Location	Civilian population in thousands, July 1, 1967	Non-Federal physicians, active and inactive[1]				Non-Federal physicians providing patient care[2]			
		Number			Rate per 100,000 civilians	Number			Rate per 100,000 civilians
		M.D. and D.O.	M.D. only	D.O. only		M.D. and D.O.	M.D. only	D.O. only	
New Jersey	6,947	10,041	9,398	643	145	9,202	8,688	514	132
New Mexico	985	1,050	928	122	107	895	788	107	91
New York	18,303	40,646	40,082	564	222	36,499	36,044	455	199
North Carolina	4,913	5,168	5,136	32	105	4,505	4,484	21	92
North Dakota	627	585	575	10	93	544	535	9	87
Ohio	10,437	14,760	13,682	1,078	141	13,401	12,539	862	128
Oklahoma	2,447	2,904	2,483	421	119	2,592	2,240	352	106
Oregon	1,994	2,935	2,766	169	147	2,555	2,422	133	128
Pennsylvania	11,612	18,728	17,163	1,565	161	16,601	15,380	1,221	143
Rhode Island	875	1,433	1,349	84	164	1,325	1,255	70	151
South Carolina	2,526	2,111	2,105	6	84	1,910	1,906	4	76
South Dakota	667	575	538	37	86	533	503	30	80
Tennessee	3,858	4,497	4,431	66	117	3,997	3,946	51	104
Texas	10,657	12,571	11,760	811	118	11,333	10,644	689	106
Utah	1,020	1,365	1,346	19	134	1,205	1,188	17	118
Vermont	416	790	745	45	190	621	590	31	149
Virginia	4,349	5,183	5,147	36	119	4,566	4,538	28	105
Washington	3,029	4,725	4,515	210	156	4,133	3,973	160	136
West Virginia	1,797	1,870	1,756	114	104	1,689	1,590	99	94
Wisconsin	4,185	5,218	5,037	181	125	4,693	4,539	154	112
Wyoming	311	322	309	13	104	297	288	9	95
Puerto Rico	2,684	2,038	2,038	-	76	1,836	1,836	-	68
U.S. outlying areas	296	203	203	-	69	181	181	-	61

[1]Excludes 27,724 Federal physicians (27,552 M.D.'s and 172 D.O.'s) and 1,660 with addresses temporarily unknown to the A.M.A. Includes 14,198 inactive physicians (12,898 M.D.'s and 1,300 D.O.'s).

[2]Includes all non-Federal physicians in office practice as well as those in training programs and on full-time hospital staffs who see patients. Excludes 30,145 non-Federal M.D.'s (11,166 on medical school faculties; 2,729 in administration; 3,352 in research; and 12,898 in inactive status), and 1,660 with addresses temporarily unknown to the A.M.A.; and 1,486 non-Federal D.O.'s (17 in administration; 127 on college faculties; 42 in miscellaneous activities; and 1,300 in inactive status); and 734 whose status was not reported to the A.O.A.

[3]Total includes 775 D.O.'s in training programs and 181 in professional full-time hospital positions, for whom distribution by State is unavailable.

Sources: A.M.A. Department of Survey Research: Distribution of Physicians, Hospitals, and Hospital Beds in the U.S., 1967: Regional, State, County, Metropolitan Areas, by J. N. Haug and G. A. Roback. Chicago. American Medical Association, 1968.

A.O.A. Membership and Statistics Department: A Statistical Study of the Osteopathic Profession, December 31, 1967. Chicago. American Osteopathic Association, June 1968.

U.S. Bureau of the Census: Population estimates. Current Population Reports. Series P-25, No. 380, Nov. 1967 and No. 392, May 1968.

Table 4. Type of professional activity and primary specialty of physicians: December 31, 1966

Primary specialty	Number of M.D.'s					Number of D.O.'s in office-based practice
	Total active	Providing patient care			Other professional activity[1]	
		In office-based practice	In hospital training programs	In hospital-based practice		
All specialties	285,857	187,100	44,937	34,729	19,091	10,114
General practice	70,223	64,063	672	4,876	612	[2]8,764
Medical specialties	65,591	38,921	11,559	8,686	6,425	335
Allergy	944	849	32	32	31	1
Cardiovascular disease	2,047	1,091	330	273	353	2
Dermatology	3,674	2,737	476	253	208	18
Gastroenterology	701	394	127	91	89	-
Internal medicine	40,314	23,210	7,536	5,646	3,922	251
Pediatrics	16,417	10,089	2,924	1,315	1,589	63
Pediatric allergy	91	68	12	4	7	-
Pediatric cardiology	172	31	57	33	51	-
Pulmonary disease	1,231	452	65	539	175	-
Surgical specialties	79,245	55,170	14,487	6,878	2,710	642
General surgery	28,756	17,987	6,747	3,028	994	270
Neurological surgery	2,189	1,332	483	204	170	4
Obstetrics and gynecology	17,444	12,890	2,629	1,321	604	75
Ophthalmology	8,735	6,819	1,184	485	247	149
Orthopedic surgery	7,982	5,564	1,441	763	214	69
Otolaryngology	5,429	4,192	735	360	142	[3]-
Plastic surgery	1,207	903	196	75	33	1
Colon and rectal surgery	647	618	14	11	4	44
Thoracic surgery	1,627	1,023	229	229	146	5
Urology	5,229	3,842	829	402	156	25
Other specialties	70,798	28,946	18,219	14,289	9,344	373
Aviation medicine	812	75	79	478	180	-
Anesthesiology	9,110	6,342	1,199	1,108	461	166
Child psychiatry	958	417	252	170	119	-
Diagnostic roentgenology	44	25	3	13	3	-
Forensic pathology	49	37	3	4	5	-
Neurology	2,295	843	574	409	469	3
Occupational medicine	1,727	1,440	16	96	175	2
Psychiatry	18,875	8,895	3,572	4,589	1,819	26
Pathology	8,914	2,458	2,168	2,945	1,343	41
Physical medicine and rehabilitation	1,140	361	219	396	164	11
General preventive medicine	1,005	422	38	180	365	-
Public health	1,679	1,037	34	176	432	-
Radiology	10,069	5,862	1,752	1,924	531	124
Therapeutic radiology	76	19	18	19	20	-
Not recognized	3,917	626	437	382	2,472	-
Unspecified	10,128	87	7,855	1,400	786	-

[1]Includes medical school faculty, administration, and research.

[2]Includes 891 with practice limited to manipulative therapy.

[3]Included in ophthalmology.

Sources: A.M.A. Department of Survey Research: Distribution of Physicians, Hospitals, and Hospital Beds in the U.S. Vol. I. Chicago. American Medical Association, 1967.

A.O.A. Membership and Statistics Department: A Statistical Study of the Osteopathic Profession, December 31, 1966. Chicago. American Osteopathic Association, June 1967.

Table 5. Pilot study results on activity of physicians as of December 31, 1966

Activity	AMA records	Questionnaire[1]	Difference
Total physicians	300,371	300,399	+ [2]28
Patient care	234,083	260,832	+26,749
Solo, partnership, group, or other practice	189,537	---	---
Direct care	---	206,974	---
Other direct care	---	1,486	---
Intern	10,513	12,543	+ 2,030
Resident/fellow	34,033	39,829	+ 5,796
Administration	4,926	11,057	+ 6,131
Teaching	10,934	4,457	- 6,477
Research	3,935	8,000	+ 4,065
Other—not direct care	---	1,400	---
Full-time hospital staff	31,840	---	---
Inactive	14,653	14,653	-

[1]Activity classification based on largest number of hours reported on 4,274 questionnaires, inflated to full coverage of all M.D.'s.

[2]Error due to rounding. Extrapolations were made on each category; categories were then summed to obtain the total numbers of physicians.

Table 6. Pilot study results on specialty of physicians as of December 31, 1966

Specialty	AMA records	Questionnaire [1]	Difference
Total physicians	300,411	300,376	+ [2]35
Unspecified	24,871	13,877	-10,994
Allergy	781	1,172	+ 391
Anesthesiology	9,432	10,213	+ 781
Aviation medicine	361	1,172	+ 811
Cardiovascular	2,193	2,583	+ 390
Child psychiatry	781	931	+ 150
Diagnostic roentgenology	---	541	+ 541
Dermatology	2,884	3,274	+ 390
Forensic pathology	60	90	+ 30
Gastroenterology	781	1,081	+ 300
General practice	65,542	61,457	- 4,085
General surgery	29,257	29,947	+ 690
Internal medicine	40,100	40,310	+ 210
Neurological surgery	2,253	2,403	+ 150
Neurology	2,463	2,403	- 60
Obstetrics and gynecology	18,804	20,516	+ 1,712
Occupational medicine	1,622	1,172	- 450
Ophthalmology	8,290	9,522	+ 1,232
Orthopedic surgery	7,600	9,041	+ 1,441
Otolaryngology	5,857	5,377	- 480
Pathology	8,411	8,981	+ 570
Pediatrics	18,383	19,254	+ 871
Pediatric allergy	60	90	+ 30
Pediatric cardiology	361	300	- 61
Physical medicine and rehabilitation	1,412	1,472	+ 60
Plastic surgery	1,262	1,562	+ 300
General preventive medicine	481	391	- 90
Colon and rectal surgery	631	691	+ 60
Psychiatry	20,426	20,666	+ 240
Public health	1,412	2,043	+ 631
Pulmonary diseases	1,202	1,322	+ 120
Radiology	10,723	10,603	- 120
Therapeutic radiology	---	150	+ 150
Thoracic surgery	1,772	1,652	- 120
Urology	5,437	5,857	+ 420
Not recognized	4,506	8,260	+ 3,754

[1]Specialty classification based on largest number of hours reported on 4,274 questionnaires, inflated to full coverage of all M.D.'s.

[2]Error due to rounding. Extrapolations were made on each category; categories were then summed to obtain the total numbers of physicians.

EXHIBIT A

OFFICIAL RECORD — IMMEDIATE RESPONSE REQUESTED

RECORD OF PHYSICIANS' PROFESSIONAL ACTIVITIES

DIRECTORY OF PHYSICIANS

AMERICAN MEDICAL ASSOCIATION
535 N. Dearborn Street
Chicago, Illinois 60610

Dear Doctor:

It is important that you complete this questionnaire immediately to bring your official record up-to-date so that we will have the correct and current information for the printing of the 1969 AMA Directory. Information from this record will be utilized to describe the distribution of physicians and to analyze health manpower.

Thank you.

Instructions

1. Please answer every question on the basis of your *current* professional activities.
2. Upon completion, return the questionnaire at your *earliest possible convenience*, using the pre-addressed envelope.

Contents

The questionnaire is divided into three sections:

I *Professional Activities*, intended to classify each physician under the types of activities in which he spends most of his time during an *average week*.

II *Specialization*, intended to find out the amount of time each physician spends in his major field of specialization.

III *Present Employer*, intended to classify each physician under the type of practice organization or employer according to the number of hours spent *per average week* under various practice arrangements.

I. PROFESSIONAL ACTIVITIES

Please describe your PRESENT professional activities by indicating the *average number of hours spent during a typical week*. Please answer EVERY question 1-8. If you do *not* spend any hours on any particular activity below, so indicate by checking the box designating "zero hours per typical week."

HOURS PER WEEK

1. How many hours per week are you being trained? (Interns, residents, or fellows)
   Indicate whether you are a(n) [1] ☐ intern [2] ☐ resident [3] ☐ fellow — ☐ zero or _____ hrs. (1,2 OR 3)

2. How many hours per week do you spend in PRACTICE INVOLVING DIRECT CARE OF PATIENTS? Direct care means seeing patients; however, it also includes patient services by such physicians as pathologists and radiologists. *Exclude time spent in training, teaching, or research. Include travel time and time spent on record keeping and other office work connected with your patients*..... ☐ zero or _____ hrs. (4)

3. How many hours per week do you spend on ADMINISTRATIVE ACTIVITIES, AS A STAFF MEMBER OR EXECUTIVE OF AN ORGANIZATION? *Exclude time spent on record keeping and office work connected with management of your own practice. Include activities connected with the administration or staff committees of a hospital or other health facility or agency, clinic or group, or any other organization by which you may be salaried as an executive or staff member*..... ☐ zero or _____ hrs. (5)

4. How many hours per week do you spend on MEDICAL TEACHING? *Include hours spent in teaching as well as in preparation for subjects taught in medical schools, nursing schools, other hospital schools, hospitals, colleges, universities, or any other educational institution.* ..... ☐ zero or _____ hrs. (6)

   OF THESE HOURS how many do you spend on direct care of patients?
   Exclude time devoted to patient care by house staff under your supervision..... ☐ zero or _____ hrs. (7)

In view of possible overlap of hours spent in teaching and research, please do not double-count such hours, but report them instead in the most applicable category.

5. How many hours per week do you spend on MEDICAL RESEARCH? *All phases of investigating medical problems regardless of source of funds for such research*..... ☐ zero or _____ hrs. (8)

   OF THESE HOURS how many do you spend on direct care of patients?
   Exclude time devoted to patient care by house staff under your supervision..... ☐ zero or _____ hrs. (9)

6. How many hours per week do you spend on any OTHER medical activities *(not listed above)* INVOLVING DIRECT CARE of patients?..... ☐ zero or _____ hrs. (10)

7. How many hours per week do you spend on any OTHER medical activities *(not listed above)* NOT INVOLVING direct care of patients?..... ☐ zero or _____ hrs. (11)

8. About how many hours per week do you spend in ALL PROFESSIONAL ACTIVITIES? ..... ☐ zero or _____ hrs. (12)

If you have checked "zero" on question 8, or if *none* of the above categories apply to you, please answer question 9.

9. Are you: [1] ☐ RETIRED [2] ☐ SEMI-RETIRED [3] ☐ DISABLED (13)
   [4] ☐ TEMPORARILY not in practice
   [5] ☐ Not active for other reasons *(please describe)*

   _____

II. SPECIALIZATION

1. Please indicate how you wish to be **DESIGNATED IN THE A.M.A. DIRECTORY** by inserting: numeral "1" next to your *primary specialty*, and *the number of hours spent per week* numeral "2" next to your *secondary specialty*, mark only one secondary specialty if any. Give *the number of hours spent per week.*

Designation "1" Primary "2" Secondary	Hours Per Week		Designation "1" Primary "2" Secondary	Hours Per Week	
_____	_____	Allergy A	_____	_____	Orthopedic Surgery ORS
_____	_____	Anesthesiology AN	_____	_____	Otolaryngology OTO
_____	_____	Aviation Medicine AM	_____	_____	Pathology PTH
_____	_____	Cardiovascular Disease CD	_____	_____	Pediatrics PD
_____	_____	Child Psychiatry CHP	_____	_____	Pediatric Allergy PDA
_____	_____	Colon and Rectal Surgery CRS	_____	_____	Pediatric Cardiology PDC
_____	_____	Dermatology D	_____	_____	Physical Medicine and Rehabilitation PM
_____	_____	Diagnostic Roentgenology DR	_____	_____	Plastic Surgery PS
_____	_____	Forensic Pathology FOP	_____	_____	Preventive Medicine (General) GPM
_____	_____	Gastroenterology GE	_____	_____	Psychiatry P
_____	_____	General Practice GP	_____	_____	Public Health PH
_____	_____	General Surgery GS	_____	_____	Pulmonary Disease PUD
_____	_____	Internal Medicine IM	_____	_____	Radiology R
_____	_____	Neurological Surgery NS	_____	_____	Therapeutic Radiology TR
_____	_____	Neurology N	_____	_____	Thoracic Surgery TS
_____	_____	Obstetrics and Gynecology OBG	_____	_____	Urology U
_____	_____	Occupational Medicine OM	_____	_____	Primary specialty not listed above:
_____	_____	Ophthalmology OPH	_____	_____ (Specify)	
					Secondary specialty not listed above:
			_____	_____ (Specify)	

2. In addition to your primary and secondary specialties indicated above, do you have a THIRD SPECIALTY? *It is not unusual for some physicians to devote significant portions of their professional time to specialties other than their primary and/or secondary specialties as listed in the A.M.A. Directory*..... 1 ☐ Yes 2 ☐ No

If *yes*, specify which specialty: _____, _____ hrs. per week

III. PRESENT EMPLOYMENT STATUS

Please indicate the current *number of hours spent per week* for the following types of employers. Please answer EVERY question 1-10. If you do *not* spend any hours for any one of the following employers, so indicate by checking the box designating "zero hours per typical week."

HOURS PER WEEK

1. Self: "solo" practice ..... ☐ zero or ____ hrs. (1)
2. Self: partnership practice ..... ☐ zero or ____ hrs. (2)
3. Arrangement with other physician(s): non-group ..... ☐ zero or ____ hrs. (3)
4. Group practice ..... ☐ zero or ____ hrs. (4)

*Name of group*_____

*address*_____

*city*_____ *state*_____ *zip*_____

5. MEDICAL SCHOOL (or parent university) ..... ☐ zero or ____ hrs. (5)
6. NON-GOVERNMENTAL hospital ..... ☐ zero or ____ hrs. (6)
7. City or county government a. HOSPITAL ..... ☐ zero or ____ hrs. (7)
   b. OTHER than hospital ..... ☐ zero or ____ hrs. (8)
8. State government a. HOSPITAL ..... ☐ zero or ____ hrs. (9)
   b. OTHER than hospital ..... ☐ zero or ____ hrs. (10)
9. Federal government a. HOSPITAL ..... ☐ zero or ____ hrs. (11)
   b. OTHER than hospital ..... ☐ zero or ____ hrs. (12)

Indicate which agency:
☐ Army (1) ☐ Public Health Service (C.C. & C.S.) (4)
☐ Navy (2) ☐ Veterans Administration (5) (13)
☐ Air Force (3) ☐ Other (6) _____ (Specify)

10. OTHER ORGANIZATION — Not listed above *(all types of insurance carriers, pharmaceutical companies, corporations, voluntary organizations, medical societies, associations, etc.)* ..... ☐ zero or ____ hrs. (14)

If the address appearing on the label is not the address at which you wish to receive *medically related material* please show the correct address below.

number and street_____

city_____ state_____ zip_____

DENTAL MANPOWER

Stanley Lotzkar, D.D.S., M.P.H., and Donald W. Johnson, D.D.S., M.P.H.[d]

Continuing reappraisal of the Nation's dental resources is necessary for early identification of emerging resource problems and development of effective remedial-action programs. Essential to any such evaluation of resources, however, is a reliable source of data upon which manpower assessments, trends, and projections may be based. Only within the last two decades have reliable source data on numbers, distribution, and professional characteristics of dental manpower become available on a nationwide basis.

SOURCES OF DENTIST DATA

The first official count of the number of dentists in the United States was made during the 1850 census, and the U.S. Bureau of the Census remained the primary source of national dental manpower information until the American Dental Association (ADA) began publishing such data in the 1940's. The 1850 census counted 2,900 dentists in a total population of 23 million—or one dentist for every 8,000 persons. By 1900 the persons-per-dentist ratio had improved to one dentist for every 2,550 persons, and by 1930, the census revealed the most favorable persons-per-dentist ratio ever attained in this country—one dentist for every 1,728 persons. At about this time, advances in the standards for dental education resulted in the closing of many proprietary schools. These advances, coupled with the growing economic problems of the depression years, reversed the trend in the supply of dentists. The 1940 census, the last before World War II, reflected the steady increase in the number of persons per dentist (to 1,870), a trend which continued into the midsixties.

Although by 1940, it was possible to determine dentist-population ratios on a nationwide or State basis, data were not available for most States showing the distribution of dentists or the dentist-population ratios within various parts of the State. Recognizing the need for more definitive information on distribution, as well as on numbers of dentists, the American Dental Association compiled and published in 1942 its *Distribution of Dentists in the United States,* containing a count of dentists (where obtainable) by city, county, and State. However, it was not until 1947 that the ADA published its first *American Dental Directory* which, together with the *Distribution of Dentists in the United States,* has become an annual publication. The Directory, in addition to name and location of dentists, lists available information on age, dental school attended, year of graduation, and area of specialization. In 1950, the ADA also began publishing every 3 years the *Survey of Dental Practice,* based on sample surveys of dentists to determine trends in such factors as number of patients seen per year, number of auxiliary personnel employed, and income of dentists. The publications of the ADA and, to a lesser extent, publications of the Bureau of the Census have provided much of the basic source material on dental manpower.

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ESTIMATES OF DENTIST MANPOWER

Current estimates and projections of the dentist supply are based upon information on the distribution and characteristics of dentists contained in the annual publications of the American Dental Association. In mid-1967, there were approximately 112,150 dentists in the United States, excluding 1967 graduates. Estimates prepared by the U.S. Public Health Service, Division of Dental Health, indicate that there were 90,715 active non-Federal dentists located in the 50 States and the District of Columbia; about 7,955 Federal dentists in the Armed Forces, Public Health Service, and Veterans Administration; and a remaining 13,480 dentists who were retired or engaged in nondental activities.

The Nation's supply of dentists in relation to the civilian population declined between 1950 and 1960. Even though the downward trend in the dentist-to-population ratio leveled off in the midsixties, the ratio still remains below the 1950 level. In 1950, there were 50 active non-Federal dentists per 100,000 civilians, while by 1967 the ratio had dropped to 46 per 100,000 (table 7).

The dentist-population ratios and, therefore, the availability of dental services vary widely throughout the Nation because of the uneven geographical distribution of dentists (table 8). In 1967, the Northeast Region had the greatest number of dentists in relation to population—58 active non-Federal dentists per 100,000 population—while the South had the least favorable dentist-to-population ratio of 34, the only region below the national average of 46. The two remaining regions, West and North Central, had ratios of 54 and 46 per 100,000 population, respectively.

Among the States, New York had the most favorable dentist-to-population ratio of 67. Only four other States—Hawaii, Massachusetts, Oregon, and Washington—had ratios as high as 60. On the other hand, 12 States, mainly in the South, had fewer than 35 active non-Federal dentists per 100,000 population with the lowest ratio of 23 occurring in South Carolina.

The distribution of dentists varies widely between metropolitan areas and nonmetropolitan counties. Furthermore, when nonmetropolitan counties are grouped according to the size of their central (largest) city, the number of dentists in relation to population declines with the size of the central city. Metropolitan areas consequently have dentist-to-population ratios twice as favorable as rural counties with central cities of less than 5,000 persons.

The median age of non-Federal dentists is 48 years and ranges over an age span of 5 years among the four census regions. The highest median age of 50 years occurs in the Northeast Region, followed by 49 years in the North Central Region. The two remaining regions, West and South, have dentists younger than the national average with median ages of 47 and 46 years, respectively.

Almost all active dentists provide care to patients, but some dentists are primarily engaged in nonclinical activities, such as teaching, research, or administration of dental programs. A number of dentists in private practice also devote a part of their professional time to teaching and research and to voluntary community services, such as examination of schoolchildren's teeth.

Although most dentists are general practitioners, the American Dental Association recognized 9,174 dental specialists in 1966. Over two-fifths—some 4,000—of the specialists limited their practice exclusively to orthodontics. The next largest group—about 2,200—specialized in oral surgery, followed by approximately 1,000 in pedodontics. Only one-fifth of the specialists engaged in one of the other five recognized areas—periodontics, prosthodontics, endodontics, public health dentistry, and oral pathology.

In 1967, 50 dental schools were in operation in the United States and Puerto Rico. Nine of these schools have been established since 1950, while several others have expanded their training facilities. As a result, the number of annual graduates has increased over 30 percent during this period. A total of 3,360 dentists were graduated in 1967, as compared with 2,565 in 1950. Undergraduate enrollment in dental schools reached a new high of 14,955 students in the academic year 1967-68.

DENTAL AUXILIARIES

In addition to dentists, the dental work force includes three auxiliary occupation groups—dental hygienists, dental assistants, and dental laboratory technicians. In 1967, the active dental auxiliary manpower supply had grown to approximately 137,000 from about 83,000 in 1950, according to estimates prepared by the Division of Dental Health. Although no directories or other basic up-to-date resource data exist for dental auxiliaries, information on the number and location of accredited training facilities, number of students enrolled, and number of graduates is available for auxiliaries, as well as for dental students, from the *Dental Students' Register,* an annual publication of the American Dental Association.

It is estimated that 15,000 dental hygienists were in practice in 1967. Since 1950, the number of active hygienists has increased by 8,000, but there are still only 16 active hygienists per 100 practicing dentists. Because part-time employment is common, the hygienist supply is actually less favorable than the ratio suggests. However, the number of schools offering the dental hygiene program has increased significantly in recent years, from 37 in 1960 to 67 in 1967. As a result, the number of students in training increased by approximately 75 percent during this period, reaching an enrollment of 4,332 students in the academic year 1967-68 with 1,729 in the 1967 graduating class.

A similar but more dramatic expansion has taken place in the number of dental assistants and, to a lesser extent, the number of dental laboratory technicians. Approximately 95,000 persons were employed as dental assistants in 1967 as compared with only 55,200 in 1950. Traditionally, dental assistants have been trained on the job by their dentist employers. However, the marked increase from 26 to 101 institutions offering accredited training programs for assistants during the 6-year period 1961-67 suggests that the pattern is beginning to shift toward formal education. Fifty-one of these 101 training programs, or half of all the programs, were added during the last 3 academic years. The number of students in training increased from 1,181 in the 1961-62 academic year to 3,819 in 1967-68, while the number of annual graduates jumped from 515 in 1961 to 1,963 in 1967.

The number of dental laboratory technicians has increased from about 21,000 in 1950 to an estimated 27,000 in 1967. The vast majority of technicians are still being trained on the job, but the move to formalize their training programs has also gained momentum recently. One-third of the 15 accredited school-based programs in operation in 1967 were established during that year. Although these 15 programs had an enrollment of 729 students in the 1967-68 academic year, the rapid gains in enrollment have not yet been reflected in the annual number of graduates—only 162 in the 1967 graduating class.

NATIONAL DENTAL DATA COMPILATION SYSTEM

The rapid increase in the population, coupled with a rising demand for dental care in recent years, has created tremendous problems with regard to ensuring an adequate supply of well-qualified dental personnel. The Division of Dental Health is developing a national data compilation system that will supplement existing information on the number, distribution, and characteristics of the manpower supply, as well as on private practice characteristics, including utilization of dental auxiliaries and patient service capacities. More comprehensive information of this type is needed to provide basic source material for estimating the Nation's dental manpower training requirements, assessing the need for continuing education and refresher courses, and developing dental care programs.

Under a contract with the Division, the American Association of Dental Examiners, working through its members—the 51 State boards of dental examiners, including the District of Columbia—has established a national system for collecting data from all licensed dentists and dental hygienists at the time of their annual or biennial reregistration with the State examining boards. The system was established for dentists beginning with the 1965 reregistration period and was expanded in 1966 to include licensed dental hygienists. As a continuation of the system, a second survey of dentists was initiated in 1967. It is intended that dentist and dental hygienist

data be collected periodically so that trends may be established.

The first dentist survey is in various stages of completion because reregistration dates vary over a 2-year period among the States. Most of the 49 participating dental examining boards mailed the survey questionnaires to the dentists with their license renewal applications. Each dentist returned the completed questionnaire to his State examining board which, in turn, forwarded all questionnaires to the American Association of Dental Examiners. The Association edits and codes the questionnaires and punches the survey data onto cards which are forwarded to the Division for machine tabulation. The Division then tabulates and analyzes the data and prepares a narrative report for each State. Data collection has been completed in all participating States, while reports containing analyses of survey results have been prepared for 20 States.

Data from the first dentist survey present a rather detailed picture of the current dentist supply within each State. In addition to the age and distribution of dentists, this information includes their current status and professional activity, such as caring for patients or teaching, their professional background, and selected practice characteristics, including area of specialization and utilization of auxiliary personnel. The second dentist survey will collect data to update the count of dentists and to provide current information on their location and activity. New types of data will also be obtained, such as the patient load of dentists and their hygienists during a 1-week period and the types of dental services provided to school-age children during the same period.

Forty-nine States participated in the survey of dental hygienists. Since the data collection procedures in the hygienist survey were patterned after those used in the dentist survey, the types of data collected for active hygienists were similar to those collected for dentists. Future career plans of licensed hygienists who were not professionally active were also obtained.

In both the dentist and dental hygienist surveys, the State dental examining boards experienced a very high response rate—about 90 percent for the dentist survey and almost 85 percent for the hygienist survey. Many of the examining boards are also furnishing available data on nonrespondents. As a result, these surveys are providing more accurate and comprehensive data than were previously available on dentists and dental hygienists.

Each State dental examining board will receive a report containing the basic data tabulations from both the dentist and dental hygienist surveys. These reports highlight the distribution and other selected characteristics of the current supply of dentists and dental hygienists, such as sources of supply, age distribution, county distribution, professional activities, and practice characteristics.

Survey findings will be useful for program planners and administrators in estimating future dental manpower requirements. Such estimates based on survey findings have already been utilized in several States for planning new and expanded dental schools and additional dental hygiene training facilities. In addition, data from the dentist and dental hygienist surveys have been used by State planning agencies, such as those involved in Regional Medical Programs and Comprehensive Health Planning.

When the data are available from all States participating in these surveys, the information will be combined to provide the basis for new dentist and dental hygienist source books which will present up-to-date national and regional summaries and analyses of the dentist and dental hygienist manpower resources, as well as data on specific State and metropolitan areas. To establish a reference for future uses of survey data, each respondent has been asked to provide his Social Security number which will permit the identification and comparison of data supplied in subsequent surveys. Through the years, it will then be possible to develop dental manpower trend data and to make longitudinal studies of the dental profession.

In view of the limited availability of basic resource data on the two remaining dental occupations—assistants and technicians—it is indeed unfortunate that they are not licensed and, therefore, cannot be included in the surveys conducted by the State examining boards. Because there is no central source, such as the State licensing boards, for contacting all dental assistants and laboratory technicians, survey procedures are

more difficult to develop for these occupations. As a first step, information about utilization of dental assistants and technicians is being sought from dentists on the survey questionnaires sent to them by the State examining board. Plans are underway for a few pilot studies in individual States to develop techniques for collecting resource data needed to provide a sound basis for planning additional training programs for these two dental auxiliaries.

It should be pointed out that the data now being collected comprise a part of a comprehensive data bank which will eventually include other important areas of dental manpower. In addition to reliable data on dentists and dental auxiliaries, detailed information on specialized groups within the dental work force is also needed. For example, as a part of the overall system of dental manpower data collection, the Division of Dental Health is also involved in the compilation of an annual directory of dental school faculty members. Under a separate contract with the American Association of Dental Schools, information is being developed which will be used in assessing current faculty practices, identifying trends, predicting future needs, and achieving optimum use of existing teaching resources.

The national data collection system, in conjunction with data already available from the American Dental Association and other sources, holds promise of serving as the foundation of future dental manpower planning. When fully operational the system will provide continuously available information on a wide range of topics which are of interest to various professional organizations, educational institutions, and government agencies. Moreover, the system will permit the use of sophisticated sampling techniques and will make feasible studies in depth of subjects such as retirement patterns, trends in specialization, productivity, and migration, which are necessary to any real understanding of the Nation's dental manpower needs.

Table 7. Dentists in relation to population: July 1, 1950, 1960, and 1967

Dentist and population	1950	1960	1967
Total dentists[1]	87,164	101,947	112,152
Total population (thousands)[2]	152,271	180,684	199,118
Dentists per 100,000 population	57.2	56.4	56.3
Active non-Federal dentists	75,313	82,630	90,716
Resident civilian population (thousands)	150,790	178,153	195,669
Active non-Federal dentists per 100,000 civilians	49.9	46.4	46.4

[1]Excludes graduates of years specified, but includes all other dentists, active or inactive.

[2]Includes all persons in the United States and in the Armed Forces overseas.

Sources: Total dentist data—Bureau of Economic Research and Statistics: Distribution of Dentists in the United States by State, Region, District and County. Chicago. American Dental Association. Annual issues and unpublished 1967 data. Adjustments to exclude graduates of specified years made by Division of Dental Health, Public Health Service.

Active dentist data—estimates prepared by the Division of Dental Health, Public Health Service.

Population data—U.S. Bureau of the Census: Population estimates. Current Population Reports, Series P-25, No. 386, Feb. 1968.

Table 8. Number of non-Federal dentists and rate per 100,000 civilians: July 1, 1967

Location	Civilian population in thousands[1]	Number of non-Federal dentists[2]		Rate per 100,000 civilians	
		Total	Active	Total dentists	Active dentists
United States	195,669	104,195	90,716	53	46
Northeast	48,091	32,247	27,746	67	58
North Central	54,866	29,451	25,207	54	46
South	60,299	22,790	20,376	38	34
West	32,410	19,707	17,387	61	54
Alabama	3,505	1,117	1,015	32	29
Alaska	238	84	79	35	33
Arizona	1,606	703	632	44	39
Arkansas	1,958	617	549	32	28
California	18,793	11,699	10,245	62	55
Colorado	1,927	1,174	1,036	61	54
Connecticut	2,912	1,918	1,705	66	59
Delaware	515	222	205	43	40
District of Columbia	793	772	670	97	84
Florida	5,902	2,951	2,559	50	43
Georgia	4,389	1,346	1,220	31	28
Hawaii	684	466	422	68	62
Idaho	695	330	301	47	43
Illinois	10,825	6,286	5,323	58	49
Indiana	4,989	2,242	1,952	45	39
Iowa	2,752	1,547	1,292	56	47
Kansas	2,255	997	847	44	38
Kentucky	3,142	1,172	1,036	37	33
Louisiana	3,622	1,333	1,194	37	33
Maine	958	426	350	44	37
Maryland	3,606	1,590	1,443	44	40
Massachusetts	5,387	3,838	3,294	71	61
Michigan	8,564	4,426	3,951	52	46
Minnesota	3,577	2,482	2,092	69	58
Mississippi	2,320	649	587	28	25
Missouri	4,565	2,323	1,922	51	42
Montana	691	365	318	53	46
Nebraska	1,423	920	765	65	54
Nevada	437	206	194	47	44
New Hampshire	681	306	271	45	40
New Jersey	6,947	4,248	3,736	61	54
New Mexico	985	320	291	32	30
New York	18,303	14,298	12,237	78	67
North Carolina	4,913	1,547	1,382	31	28
North Dakota	627	290	242	46	39
Ohio	10,437	5,097	4,424	49	42
Oklahoma	2,447	982	863	40	35
Oregon	1,994	1,489	1,314	75	66
Pennsylvania	11,612	6,539	5,565	56	48
Rhode Island	875	474	415	54	47
South Carolina	2,526	634	569	25	23
South Dakota	667	299	247	45	37
Tennessee	3,858	1,574	1,426	41	37
Texas	10,657	3,918	3,530	37	33
Utah	1,020	621	554	61	54
Vermont	416	200	173	48	42
Virginia	4,349	1,732	1,583	40	36
Washington	3,029	2,101	1,869	69	62
West Virginia	1,797	634	545	35	30
Wisconsin	4,185	2,542	2,150	61	51
Wyoming	311	149	132	48	42

[1] State figures do not add to total due to rounding.

[2] Excludes graduates of the 1967 class.

Sources: Total dentist data—Bureau of Economic Research and Statistics, American Dental Association. Chicago. 1967 data unpublished. Adjustment to exclude 1967 graduates made by Division of Dental Health, Public Health Service.

Active dentist data—estimates prepared by Division of Dental Health, Public Health Service.

Population data—U.S. Bureau of the Census: Population estimates. Current Population Reports, Series P-25, No. 380, Nov. 1967.

NURSING MANPOWER

Eugene Levine, Ph.D., and Eleanor D. Marshall, B.A.[c]

SOURCES OF NURSE SUPPLY DATA

Data on nurse supply are obtained from three main sources:

1. Decennial census of the U.S. Bureau of the Census
2. Biennial estimate prepared by the National League for Nursing, American Nurses' Association, American Hospital Association, and Public Health Service (Interagency Conference on Nursing Statistics)
3. American Nurses' Association inventories of registered nurses

Decennial Census

The decennial census provides rather comprehensive data on occupational fields. Census data pertaining to nursing for the years 1910 to 1960 are contained in *Health Manpower Sourcebook: Section 2, Nursing Personnel* (Public Health Service Publication No. 263, Section 2, revised January 1966) and also in the various editions of the American Nurses' Association's *Facts About Nursing*.

Because of reporting errors, adjustments have had to be made to improve the accuracy of census data. For example, the 1950 census count of 400,000 total active registered nurses had to be adjusted downward to 375,000 because of the inclusion of some student nurses in the count. The 1960 census count was 582,000, which was considerably higher than the Interagency estimate of 504,000 for that year, and there was reason to believe that much of the higher census count was due to errors in sampling and reporting. In addition to these discrepancies, other limitations of census data as a source of nurse supply data include the fact that the data are not categorized by field of employment and they are not available frequently enough to provide current data or to be useful in trend analysis.

Interagency Estimate

Since 1952, representatives of the National League for Nursing, American Nurses' Association (ANA), and Public Health Service have been meeting biennially to prepare an estimate of the number of registered nurses employed in the United States by field of practice. This group, known as the Interagency Conference on Nursing Statistics, has released nurse supply estimates for the even-numbered years 1954-66 and, beginning in 1967, on an annual basis (table 9).

The Interagency estimate is prepared from data for selecting fields of nursing obtained from various sources (table 10). For some nursing

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fields, supply counts are obtained from employers of nurses through ongoing surveys conducted by professional or governmental organizations:

Field	*Sources of data*
Hospitals	Annual survey of hospitals, American Hospital Association (nursing data discontinued in 1960 but gathered in special surveys conducted in 1962, 1964, and 1966)
	Annual survey of osteopathic hospitals, American Osteopathic Hospital Association
Nursing homes	Survey of manpower resources in nursing homes, Public Health Service (1966)
Public health (including school nursing and occupational health)	Biennial survey of public health agencies, Public Health Service (since 1937)
Nursing education	Biennial survey of schools of nursing, National League for Nursing (since 1960)

The advantage of the Interagency Conference on Nursing Statistics' estimate is that it provides a current estimate of nurse supply. Since an estimate has been made every other year, beginning in 1954, it also provides a time series for analyzing trends.

The limitations of the Interagency estimate are:

1. It combines data from different sources which have varying degrees of accuracy.
2. It depends on sources of data over which the Interagency Conference on Nursing Statistics has little control. In 1960, for example, the American Hospital Association discontinued the collection of data on nursing personnel as part of the annual survey of hospitals. In 1962, at the urging of the Conference, a special survey of hospital nurse supply was undertaken by the American Hospital Association. This survey was repeated on a sampling basis in 1964. In 1966, nursing data were gathered as part of a comprehensive survey of manpower resources in hospitals.
3. It provides nurse supply estimates only for the United States as a whole.

Inventories of Registered Nurses

As indicated, the census conducted by the Federal Government is one source of data on nurse manpower. If the decennial census could provide sufficiently detailed, reasonably accurate, and up-to-date data on registered nurses, there would be no need for the American Nurses' Association to conduct another census for that purpose. It was precisely the limitations in census data which, in 1950, led to the exploration of other ways in which to measure the Nation's supply of registered nurses.

The primary problem with the census data is that it suffers from the tendency of some people to define their occupations rather loosely or to upgrade themselves. When one considers that practical nurses, aides, orderlies, and attendants, as well as registered nurses, all function in nursing service, it is conceivable that errors in classification can occur. However, the inclusion of people in the registered nurse category who do not belong there not only distorts the data on detailed characteristics, but also precludes comparison of information about nurses with those of other occupational groups.

One criterion which the ANA sought in the approach to conducting an inventory would be to rule out the inclusion of other nursing groups in the registered nurse category. Working through the State licensing mechanism provided a mechanism for doing this.

Every State, and the District of Columbia, issues licenses to practice nursing. These State governmental agencies do maintain statistics on the licenses they issue. In the aggregate, there are many more licenses than there are nurses since a substantial number of nurses maintain licenses in more than one State. Also, nurses are not always licensed in the State in which they are located. The State licensure counts, then, are not synonymous with nurse counts nor do they represent the State's nurse supply. The licenses which a State issues belong to nurses

both within and without its borders. A State's own licensure total may fail to include those nurses living or working within its borders who are *not* licensed there, people who are actually part of its labor force or potential labor force. These limitations are pointed out because so often groups conducting State surveys of nurse manpower needs and resources consider only the licenses issued by their State licensing boards, not realizing the distorted picture of actual nurse supply which often results.

Although licensure statistics are not useful for the purpose of assessing manpower, the mechanism for renewing licenses is most useful. It provides an additional advantage over conducting a census restricted to employed persons or persons seeking work; it enables securing information on part of the *potential* labor force—that is, nurses who are inactive but legally qualified to practice by virtue of holding a current license.

In the first three Nurse Inventory Studies—in 1949, 1951, and 1957—the ANA experimented with slightly different procedures. The first Inventory utilized a post card questionnaire. In the second Inventory, a separate questionnaire was mailed out with the license renewal application. In each case, the State board of nursing handled the mailing to its registrants. Since in each Inventory the questionnaires were returned to the ANA rather than the State agency, problems were encountered with the percentage of returns. The third Inventory sought to reduce this factor by incorporating the Inventory questions into the renewal notice itself. The procedure for handling data for the 1957 study was decentralized; that is, each State arranged to have its data processed locally according to a manual of instructions prepared by project directors in the ANA Research and Statistics Department. The decentralization resulted in some differences in interpretation and application of the instructions. Uniformity is of utmost importance since the data cards from each of the States are merged into one deck. Also, the collection of data often spanned entire renewal periods. Although about half of the States renewed licenses every year, the balance renewed over a 2-year period. This proved too lengthy a time in which to conduct such a census. Cost was an overriding factor throughout.

It seemed obvious that a way had to be found to retain the best elements of the methodology of the three studies. In 1962, the ANA contracted with the Public Health Service to conduct the 1962 Inventory. In addition to having gained knowledge and experience through the establishment of procedures for the three prior Inventories, ANA's role as coordinator of the efforts of 51 separate governmental units is enhanced by its special relationship with the boards through its Council on State Boards of Nursing. The financial support received from the Public Health Service for data processing and certain costs other than staff, equipment, and overhead at ANA enabled the centralization of processing operations.

As a result of the previous work in conducting inventories, most of the licensing application forms already contained the basic set of Inventory questions. Where this was not so, the ANA submitted redesigns of State forms to accommodate the needs of the Inventory as well as those of the licensing agency. In those States where it was not possible to use the application form, a separate questionnaire was sent to the nurses. Rather than use an entire licensing period, a cutoff date was selected for each State to ensure as full coverage as possible. The completed application forms were sent to the ANA by the States. In the few places where the forms could not leave the States, arrangements were made to obtain the data by other means. Usually this involved visiting the State to hire and train personnel for editing and coding the raw data and to arrange with local firms for machine data processing.

Almost a million licenses were processed in that 1962 Inventory. Elimination of the duplicate licenses was achieved through alphabetizing of names and addresses, a particularly unwieldy process. In the 1966 Inventory, which the ANA is presently completing under contract with the Public Health Service, the Social Security number is being used for that purpose. After allowing for duplication of those licensed in more than one State, the resulting master deck of cards is sorted according to the State in which the nurse is employed or, if not employed, according to State of residence.

Detailed tables on such characteristics as age, sex, marital status, field of employment, type of position, area of clinical practice, and educational preparation are prepared for each State and for the United States. A complete analysis and presentation of tabular material appear in a separate report, and selected data are published in *Facts About Nursing,* a statistical reference book published annually by the ANA (table 11). Thus, the Inventory of Registered Nurses, conducted by the American Nurses' Association, represents bench mark data on supply and potential supply and is a reasonably complete universe count. The availability of a complete card file on registered nurses at the conclusion of each Inventory represents a ready universe to be utilized for more detailed studies of segments of the nurse population.

CHARACTERISTICS OF THE NURSE MANPOWER SUPPLY

Nursing is, perhaps, the most complex of all health manpower fields. An outstanding characteristic of nurse manpower is this complexity, which stems from the following characteristics, making measurement of the nurse supply a challenging task.

1. Size of the manpower field.—The most numerous of all health manpower categories is the field of nursing. As of January 1, 1967, about half of the Nation's health manpower were employed in nursing: 640,000 as registered nurses; 300,000 as practical nurses; 700,000 as aides, orderlies, and attendants; and 10,000 in a newly emerging group called home health aides. In addition, there are over a half-million persons in the United States today who have received training in the nursing field but who are not actively employed in nursing: 500,000 registered nurses and more than 100,000 practical nurses, aides, and orderlies. Furthermore, almost 200,000 students are currently being trained in schools of nursing: 130,000 in schools of nursing (R.N.) at the undergraduate level, 13,000 at the graduate level, and 33,000 in schools of practical nursing.

Because of its large size, nursing manpower is beset with numerous problems. One problem is the need to maintain huge educational resources to meet the demands for new manpower. These demands arise from steadily increasing nursing needs and the constant attrition and mobility among the existing manpower supply. Take registered nursing alone. Over 20,000 new nurses have to be graduated each year just to keep up with attrition. This is 50 percent greater than the total number of graduates from medical, dental, and pharmacy schools combined.

2. Varied geographic distribution.—If the distribution of nurse manpower is analyzed, great variation is found geographically. No two States in the Nation have the same ratio of nurses to population. In 1962, Arkansas, at the lowest end, had 119 registered nurses per 100,000 population. New Hampshire, at the top, had 474 nurses per 100,000 population. Practical nurses ranged from 52 per 100,000 population in Alaska up to 220 per 100,000 population in Massachusetts.

Moreover, the urban-rural distribution is also extremely variable. Compared with urban areas, rural areas have relatively fewer registered nurses per 100,000 population:

Area	*Nurse-population ratio*
Greater metropolitan	328
Lesser metropolitan	240
Adjacent to metropolitan	254
Semi-isolated rural	243
Isolated rural	126

When States are grouped regionally, significant differences are found from one section of the country to another. In the Northeast, there were 413 registered nurses per 100,000 population in 1962; the southern States had a ratio of only 215 per 100,000 population.

Finally, as individual institutions are examined, great variation is found in nurse manpower employment patterns from one institution to another. Some hospitals, for example, maintain staffing ratios of nearly two nursing personnel for each patient while others have as few as two nursing personnel for every eight patients.

This great variation in distribution of nurse manpower underscores the difficulties in trying to meet health manpower needs of people in different parts of the Nation. Although some of the variation is attributable to differences in

demand—the Northeast Region has a higher proportion of older persons than does the Southern Region—some of it signifies the inability of certain areas of the country to provide needed man power resources.

3. Employment diversity.—Nursing personnel are found in a great variety of employment settings. Although the vast majority are employed by hospitals, as many as 70,000 registered nurses are in private duty, over 40,000 are employed in the offices of physicians, and 40,000 are working for public health agencies and boards of education.

As employers of nurses, hospitals and related institutions vary greatly in their characteristics. Hospitals range in size from under 10 beds to as many as 10,000 beds, and this variation presents many differences in job requirements, responsibilities, and work assignments. Hospitals also vary by type of patients cared for. Although the majority are classified as general hospitals, there are large numbers of psychiatric, tuberculosis, and chronic and convalescent hospitals. Moreover, differences in the ownership of hospitals provide variety in employment settings—governmental hospitals have different characteristics from nonprofit community hospitals which in turn differ from proprietary hospitals.

Although no accurate count of the number of different employers of nursing personnel is available, it is estimated that over 80,000 are in existence today.

Hospitals	9,000
Clinics and other outpatient facilities	1,000
Nursing homes, homes for the aged, etc	25,000
Public health agencies, including VNA	3,000
Elementary and secondary schools	5,000
Schools of nursing	1,100
Industrial offices and plants	4,000
Physicians' and dentists' offices	40,000

4. Functional differences.—There are three major categories of nurse manpower: the registered nurse, the licensed practical nurse, and the auxiliary nurse who may be called a nursing aide, nursing assistant, orderly, or attendant. The latter also includes a new category—the home health aide—which has been created to assist in home nursing care programs. The main categories of nurse manpower are differentiated not only functionally, with highest level duties assigned to the R.N. and least skilled to auxiliary personnel, but also in terms of educational attainment. The registered nurse is a graduate of an approved school of nursing which can be a 2-year junior college program, a 3-year hospital-based program, or a 4-year baccalaureate program. The licensed practical nurse, unless licensed by waiver on the basis of experience, is a graduate of an approved school of practical nursing, usually a 1-year educational program. Aides, orderlies, and attendants generally have no formal training but are prepared on the job.

In addition to diversity in educational preparation, other differences are found when the particular functions that nursing personnel perform are examined. This is particularly true for registered nurses. Functions differ according to the field within which a nurse practices. A hospital nurse performs different duties than, say, a nurse in the health unit of an industrial plant. Moreover, within most fields, a variety of job titles can be found. This is especially true for hospitals. Many hospitals have more than a half-dozen different job categories for registered nurses, including the staff nurse, head nurse, supervisor, inservice educational director, and director of nurses.

The great variation in the geographic distribution of nurse manpower, the many kinds of employment settings in which they work, their differing educational preparation, and the variety of functions they perform greatly complicate the analysis of this most numerous health manpower field and make measurement of the manpower supply quite difficult, indeed. Moreover, many pressures, trends, and influences are at work which directly affect nurse manpower supply and needs. When these are superimposed on the diversity of nurse manpower supply, assessment of present and future nurse manpower needs becomes an almost impossible task. Nevertheless, we do have considerable information about the nurse supply and, in the near future, will know even more as the results of the latest Inventories become available.

Table 9. Registered nurses in relation to population: selected years, 1950 through 1968

Year	Resident population in thousands	Number of nurses in practice			Nurses per 100,000 population
		Total	Full-time	Part-time	
1968[1]	199,017	659,000	---	---	331
1967[1]	196,967	640,000	---	---	325
1966[1]	194,899	621,000	---	---	319
1964[1]	190,169	582,000	450,000	132,000	306
1962[1]	184,598	550,000	433,000	117,000	298
1960[1]	178,729	504,000	414,000	90,000	282
1958	171,922	460,000	---	---	268
1956	165,931	430,000	---	---	259
1954	159,825	401,600	---	---	251
1950	150,697	375,000	335,000	40,000	249

[1] In 50 States and the District of Columbia.

Sources: Interagency Conference on Nursing Statistics for 1954-1968 estimates; U.S. Bureau of the Census for 1950 on nurses (adjusted).

U.S. Bureau of the Census: Population estimates. Current Population Reports. Series P-25, No. 327, Feb. 1966, and No. 389, Mar. 1968.

Table 10. Field of employment of registered nurses: January 1, 1967

Field of employment	Number of nurses	Percent of total
Total	640,000	100.0
Hospitals, nursing homes, and related institutions	431,000	67.3
Public health and school	41,500	6.5
Occupational health	19,500	3.0
Nursing education	24,000	3.8
Private duty, office, and other fields	124,000	19.4

Source: U.S. Department of Health, Education, and Welfare, Public Health Service, Division of Nursing. Nurse Training Act of 1964. Program Review Report. Public Health Service Pub. No. 1740. Washington, U.S. Government Printing Office, December 1967, p. 60.

Table 11. Number of employed registered nurses and ratio to population for States: 1966

Geographic division and State	Employed nurses (adjusted figure)	Nurse-population ratio[1]
United States	613,198	313
New England	57,268	509
Connecticut	15,444	537
Maine	4,045	414
Massachusetts	28,752	532
New Hampshire	3,520	521
Rhode Island	3,673	409
Vermont	1,834	446
Middle Atlantic	145,013	395
New Jersey	24,936	361
New York	74,286	408
Pennsylvania	45,791	395
South Atlantic	78,459	270
Delaware	2,098	409
District of Columbia	3,664	454
Florida	21,775	370
Georgia	6,956	156
Maryland	10,004	277
North Carolina	12,129	244
South Carolina	5,619	217
Virginia	11,506	258
West Virginia	4,708	260
East South Central	22,635	176
Alabama	5,911	168
Kentucky	6,296	198
Mississippi	3,672	157
Tennessee	6,756	175
West South Central	34,184	182
Arkansas	2,607	133
Louisiana	6,757	187
Oklahoma	4,650	188
Texas	20,170	188
East North Central	118,572	306
Illinois	35,560	330
Indiana	12,835	259
Michigan	23,447	277
Ohio	32,647	315
Wisconsin	14,083	338
West North Central	51,538	323
Iowa	9,981	362
Kansas	6,894	303
Minnesota	14,441	404
Missouri	11,290	247
Nebraska	4,729	329
North Dakota	2,114	329
South Dakota	2,089	308
Mountain	25,738	334
Arizona	5,862	366
Colorado	8,315	425
Idaho	1,954	280
Montana	2,483	354
Nevada	1,058	245
New Mexico	2,510	250
Utah	2,347	233
Wyoming	1,209	379
Pacific	79,791	322
Alaska	593	224
California	58,683	312
Hawaii	2,340	322
Oregon	6,814	345
Washington	11,361	374

[1]Number of nurses per 100,000 population based on July 1, 1966, estimates of resident population. (U.S. Bureau of the Census, Current Population Reports, P-25, No. 380.)

Source: ANA Research and Statistics Department, 1968.

PHARMACIST MANPOWER

Fred T. Mahaffey, B.S., R.Ph., and Maryland Y. Pennell, M.Sc.[f]

Approximately 122,000 pharmacists were actively engaged in this health profession at the beginning of 1967. This estimate is based on State registrations reported by the individual State Boards of Pharmacy to the National Association of Boards of Pharmacy (NABP).

Pharmacy is the health profession which is concerned with the preparation and the distribution of medicinal products. It is the art and science of preparing, from natural or synthetic sources, materials for the prevention, diagnosis, and treatment of disease. Pharmacy also includes the professional, legal, and economic function of distributing medicinal products properly and safely. In the distribution of medicinals, the pharmacy profession operates within the framework of Federal and State laws and in accordance with ethical principles. Thus the pharmacist promotes and safeguards public health.

In the early years of this country, only two occupations were generally licensed by the States—medicine and law. Pharmacy was one of the fields that had branched out from medicine when institutions of higher learning placed more emphasis on functional specialization. This led to a desire for occupational and professional self-government.

Occupational groups began organizing into associations at the national level just prior to the Civil War. The American Medical Association was organized in 1847 and was followed by the American Pharmaceutical Association in 1852. These and other national associations urged State legislation to protect public health and safety by allowing each profession to control itself from within. Through legislation and professional control, codes of conduct and standards of competence were established. Legal rosters of qualified practitioners were also made available through State licensing agencies. The profession, or peer group, was granted the right to control or be represented on the licensing boards set up to regulate the profession in question. Before 1880, statutes were enacted for the licensing of three health professions: physicians in 11 States, pharmacists in 6 States, and dentists in 8 States. By 1910, all States, except Alabama and the Territories of Alaska and Hawaii, had licensure provisions for pharmacists.

Pharmacists are among the 11 professions and occupations in the health field for which all States now have licensing requirements. Pharmacy practice acts are restrictive, embodying the principle that no person may practice the profession unless he has satisfied specific requirements and then applied for and received a license.

With the establishment of the National Association of Boards of Pharmacy in 1904, and later through a central office in 1914, came the opportunity to assemble national statistics based on State registrations. The NABP was the first organization composed of State agencies licensing a specific occupation which banded together for mutual benefit. The basic purpose of the

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Association was to provide and promote interstate exchange of licenses by reciprocity. This same goal remains today, but, as can be imagined, the activities have expanded tremendously over the years. Beginning in the early forties, the secretary of each State pharmacy licensing board was asked to provide the NABP with information on the numbers of licenses issued during the past year and the number in effect as of the first of January of each year. These licensure statistics have been published annually in the *Proceedings* of the NABP since 1948.

Before discussing in detail the 1967 tabular data, some of the problems involved in the collection of manpower statistics should be mentioned. The first national statistics on pharmacist manpower are those available from the 1900 Census of Population. At the turn of the century, the decennial census enumerated about 46,000 pharmacists. By 1960 this count had increased to approximately 92,000. As a measure of pharmacist manpower, however, the census returns leave something to be desired. Problems of household respondents reporting of occupations and coding practices that follow make it difficult to sort out properly the detailed categories of health personnel. The census questionnaire does not request information on professional degree or on license to practice, each of which would be positive identification for pharmacists. Moreover, since the tabulations classify according to kind of work, pharmacists who are teachers, administrators, and in other managerial positions would be excluded from the health field.

The information presented in the accompanying tables has been gathered through the secretaries of the Boards of Pharmacy in each of the 50 States, the District of Columbia, the Commonwealth of Puerto Rico, and the Virgin Islands. The omissions in the data show that the Board did not provide the complete range of information. The statistics are reliable enough to make totals and percentages significant for the pharmacy population as a whole.

Very few of the State boards have individual punchcards on pharmacists registered in their States that can be machine processed for information on activity status, type of practice, age, sex, and professional education. For some of the smaller States, it is often difficult to provide information beyond the count of licenses issued during the year. In addition to knowing the total number of pharmacists in good standing, we also want to know the number of pharmacists who are residing and practicing within the State. For example, the 1966 *Proceedings* shows a table for national totals, accompanied by remarks calling attention to unusual differences between the 1966 figures and those of the previous year. Between these 2 years, Florida, Iowa, and Massachusetts substantially increased their figures on resident active pharmacists by 2,800, while Michigan reported 14,000 less. The differences mentioned above are attributed to the utilization of more efficient record keeping methods, which should result in more accurate statistics in the future.

Pharmacist registrations as of January 1, 1967, numbered 172,635 (table 12). These include persons who are licensed in one or more States—some with as many as nine registrations. When those who have out-of-State addresses are excluded, the number drops to 132,900, which is the closest approximation of persons trained in pharmacy. When pharmacists who have not renewed their licenses and thus are no longer active are eliminated, this figure drops to 122,421 active pharmacists.

In relation to population, there are 61.6 pharmacists, active and inactive, per 100,000 population. Significant differences appear among the regions of this country. The Northeastern Region has the highest ratio, with 75 pharmacists per 100,000. In the South, the ratio was 55. The North Central and West Regions had ratios of 56 and 62, respectively.

The District of Columbia and Massachusetts each exceed 100 pharmacists per 100,000 population. At the other end of the scale are Alaska and Hawaii with about 30 per 100,000.

Nearly 8 percent of the active pharmacists are women (table 13). Among the reporting States, female pharmacists account for less than 5 percent of the total in Arkansas, Connecticut, Nevada, New York, and Vermont. The proportion of pharmacy students who are women is increasing and should be reflected soon with larger active numbers in the profession.

Only 30 of the 53 jurisdictions were able to provide information on educational qualification,

and too few of the Northeastern States are included to warrant regional comparisons. Maine and Vermont, which did report, show relatively large numbers on nongraduates, since these States were among the last to raise minimum levels for licensure. For the Nation as a whole, 7 out of 10 pharmacists have 4, 5, or 6 years of post-high-school education. Current educational requirements call for a bachelor's degree from a recognized college of pharmacy, representing at least 5 years of study beyond high school. The level was raised from 4 to 5 years in 1960.

According to the age distribution of pharmacists in table 14, about 19 percent are under 30 years of age and 8 percent are 65 or older. How reliable this information is cannot be determined. Some of the States reported considerably different distributions in earlier *Proceedings*.

About 98,000 or 86 percent of the active pharmacists practice in community—that is, retail—pharmacies. In our data, hospital pharmacies account for about 6,700 pharmacists. However, the American Society of Hospital Pharmacists estimates that a total of approximately 10,000 pharmacists are practicing full time or part time in hospitals. Pharmacists employed by manufacturers and wholesalers account for 4,500; teachers in colleges of pharmacy, government, and other personnel make up the balance (table 15).

The proportion of pharmacists who practice in community pharmacies ranges from about 88 percent in the South and the West to 85 percent in the North Central and 81 percent in the Northeastern Regions. Maine, with 96 percent in retail practice, has the highest State proportion. Many other rural States also have relatively large numbers in this type of practice, for example, Alaska, Idaho, and Wyoming.

Pharmacists who are employees in community pharmacies only slightly outnumber those who are owners, partners, or stockholders of community pharmacies. As shown in table 15, 54 percent of the 98,000 pharmacists practicing in community pharmacies are employees. This proportion is considerably higher in the Northeastern Region (63 percent) and lower in the West (48 percent). The District of Columbia and Maryland each report that more than three-fourths of their community pharmacists are employees, indicating a different employment pattern from that in the States with lower percentages.

Information on the numbers of community pharmacies and hospital pharmacies has also been supplied by the State Boards of Pharmacy where they are the licensing agencies for those outlets. However, in some States, the Board of Health or some other agency licenses hospital pharmacies. Inasmuch as we do not have data from the latter agencies, there is an understatement of the numbers in table 16. The number of hospitals with pharmacies attended by a registered pharmacist reported in the *Guide* issue of the *Journal of the American Hospital Association* differs considerably from some of the statistics presented here.

When the number of community pharmacies is related to the number of pharmacists in attendance, it becomes apparent that about 22 percent of the pharmacists practice in one-person outlets. In the South, the proportion reaches 25 percent; in the Northeastern Region, it is as low as 18 percent. Conversely, 42 percent of the community pharmacies operate with one pharmacist. In Puerto Rico the proportion is 94 percent, markedly higher than that in any of the States.

The NABP, under contract with the U.S. Public Health Service, is completing an Inventory of Pharmacy Manpower in the United States. Every licensed pharmacist in this country has been contacted through the mechanism of State license renewal. The roster of all pharmacists in the United States being developed from this survey will provide data similar to those in the accompanying State tables. However, the information will be more reliable and complete since it is based on a standardized questionnaire. Nevertheless, there exist problems of collection over a period of time due to lack of uniformity of license renewal dates.

To check on the accuracy of licensure as a measure for gathering valid manpower statistics, we plan to assemble the names of graduates of our colleges of pharmacy over a period of years and to check these against the master file. A special study will be made to determine the whereabouts of those who are missing from the

master file. This will give us a means of determining those graduates who are lost to professional practice by going into some other field. Additional studies could also be done on professional education, work experience, and site of practice as these relate to the location of our colleges of pharmacy throughout the United States.

The limited information available indicates that there are numerous employment opportunities for pharmacists throughout the country. There are some indications from the Board of Pharmacy secretaries that serious shortages exist in some areas. These shortages seem to be more acute in the rural States than in States having large metropolitan areas. Information available on staffing in hospital pharmacies obtained through the 1966 American Hospital Association-Public Health Service survey of registered hospitals indicates a need for about 600 pharmacists in this area.

Employment possibilities for pharmacists are expected to show a small increase within the next few years, according to the Bureau of Labor Statistics.[8] This increased need will be approximately 5 percent between 1966 and 1975, representing a slightly slower rate of growth than for the 1955-66 period.

The extended use of the pharmacist's expert knowledge on drugs and their control will be greatly needed in the expanding area of hospital practice. The profession itself is taking steps to orient the community pharmacist toward assuming additional responsibilities in institutional practice. This would include hospitals of varying sizes, extended care facilities, and nursing or custodial homes. Acting as a consultant to the professional staff of a home or small hospital, the pharmacist can increase the efficiency of the overall drug utilization program of the institution, leaving other professional personnel with additional time to do a more thorough job of improving patient care in their own areas of practice.

There are increasing signs that the pharmacy curriculum is and in the years ahead will continue to become more patient oriented. Actual clinical experiences are being encountered by many of our newer graduates. These experiences are gained through broad exposure to hospital pharmacy and observation of the effect of prescribed medication on the patient. Many feel that it will be only a matter of a few years until pharmaceutical education will include a required course in hospital pharmacy, giving the student a broad taste of clinical exposure to patient care.

If pharmacy and pharmaceutical education meet these challenges properly, enrollments in our colleges of pharmacy should continue to increase not only to the high levels that have been predicted but possibly beyond. The problem will be in producing an adequate number of graduates to replace those who die, as well as for the additional growth needed to meet the demands of an intensified medical care program.

Table 12. Pharmacist registrations according to residence and activity status and ratio of pharmacists to population: January 1, 1967

Location	Total registrations	Pharmacists resident in State			Pharmacists out of State	Active pharmacists per 100,000 population[1]
		Total	Active in practice	Not in practice		
Total	172,635	[2]132,900	122,421	10,479	39,735	61.6
Alabama	2,242	1,751	1,613	138	491	45.9
Alaska	177	86	86	---	91	32.4
Arizona	2,313	1,164	992	172	1,149	61.9
Arkansas	1,609	1,149	946	203	460	48.4
California	12,600	11,790	10,720	1,070	810	57.0
Colorado	3,042	1,862	1,616	246	1,180	82.7
Connecticut	3,094	2,575	2,498	77	519	86.8
Delaware	443	258	234	24	185	45.6
District of Columbia	1,805	954	862	92	851	106.9
Florida	5,828	4,805	4,697	108	1,023	79.7
Georgia	3,432	2,651	2,405	246	781	54.1
Hawaii	250	200	200	---	50	27.6
Idaho	1,332	518	450	68	814	64.6
Illinois	8,818	6,714	5,889	825	2,104	54.6
Indiana	4,719	3,376	2,978	398	1,343	60.1
Iowa	2,903	1,789	1,621	168	1,114	58.7
Kansas	2,286	1,501	1,326	175	785	58.3
Kentucky	2,074	1,658	1,560	98	416	49.0
Louisiana	2,490	2,030	2,000	30	460	55.3
Maine	791	434	434	---	357	44.4
Maryland	2,659	2,368	2,109	259	291	58.4
Massachusetts	6,475	5,616	5,616	---	859	103.9
Michigan	5,685	5,603	5,175	428	82	61.1
Minnesota	3,247	2,379	2,126	253	868	59.5
Mississippi	1,383	1,076	1,037	39	307	44.4
Missouri	4,510	3,069	2,609	460	1,441	57.2
Montana	817	512	397	115	305	56.6
Nebraska	2,018	1,168	1,007	161	850	70.0
Nevada	2,366	328	316	12	2,038	73.3
New Hampshire	473	364	361	3	109	53.3
New Jersey	5,980	4,784	4,198	586	1,196	60.8
New Mexico	1,118	598	566	32	520	56.5
New York	18,068	15,256	13,723	1,533	2,812	75.4
North Carolina	2,347	2,019	1,876	143	328	37.7
North Dakota	1,084	408	340	68	676	52.9
Ohio	8,095	6,841	6,474	367	1,254	62.5
Oklahoma	2,948	2,001	1,972	29	947	79.6
Oregon	2,201	1,667	1,509	158	534	76.5
Pennsylvania	10,716	8,216	8,216	---	2,500	70.8
Puerto Rico	918	918	918	---	---	34.4
Rhode Island	1,081	816	717	99	265	80.0
South Carolina	1,410	1,287	1,250	37	123	48.3
South Dakota	937	480	480	---	457	70.7
Tennessee	3,069	2,388	2,388	---	681	61.8
Texas	7,826	6,495	5,783	712	1,331	53.8
Utah	1,181	601	601	---	580	59.7
Vermont	800	209	201	8	591	48.9
Virginia	2,408	1,967	1,783	184	441	39.9
Virgin Islands	25	21	21	---	4	42.4
Washington	3,512	2,611	2,285	326	901	75.1
West Virginia	1,036	706	706	---	330	39.0
Wisconsin	3,183	2,567	2,257	310	616	54.2
Wyoming	811	296	277	19	515	86.8

[1]Rates based on provisional estimates of total resident population as of July 1, 1966. U.S. Bureau of the Census: Population estimates. Current Population Reports. Series P-25, No. 373, Sept. 5, 1967, and Series P-25 No. 358, January 18, 1967.

[2]Data on activity status not available for 8,922 pharmacists in Pennsylvania and West Virginia, counted here as in practice.

Table 13. Sex and education of resident pharmacists engaged in practice: January 1, 1967

Location	Resident pharmacists in practice	Sex			Professional education				Percent with 4, 5, or 6 years' education
		Male	Female	Percent female	4, 5, or 6 years	3 years	2 years	Non-graduate	
Total	[1]122,421	82,432	7,092	7.9	40,230	5,843	6,884	3,444	71.3
Alabama	1,613	1,505	108	6.7	1,566	16	20	11	97.1
Alaska	[2]86	70	16	18.6	---	---	---	---	---
Arizona	992	941	51	5.1	610	54	104	224	61.5
Arkansas	946	914	32	3.4	618	22	86	220	65.3
California	10,720	9,950	770	7.2	5,902	2,670	1,754	394	55.1
Colorado	1,616	---	---	---	---	---	---	---	---
Connecticut	2,498	2,443	55	2.2	---	---	---	---	---
Delaware	234	219	15	6.4	---	---	---	---	---
District of Columbia	862	717	145	16.8	---	---	---	---	---
Florida	4,697	---	---	---	---	---	---	---	---
Georgia	2,405	2,225	180	7.5	---	---	---	---	---
Hawaii	[2]200	---	---	---	---	---	---	---	---
Idaho	450	385	65	14.4	383	34	20	13	85.1
Illinois	5,889	---	---	---	---	---	---	---	---
Indiana	2,978	2,711	267	9.0	2,347	228	267	136	78.8
Iowa	1,621	1,479	142	8.8	1,110	16	470	25	68.5
Kansas	1,326	1,201	125	9.4	772	88	121	345	58.2
Kentucky	1,560	1,409	151	9.7	---	---	---	---	---
Louisiana	2,000	1,773	227	11.4	1,347	240	240	173	67.4
Maine	[2]434	408	26	6.0	205	30	18	181	47.2
Maryland	2,109	1,946	163	7.7	1,549	355	189	16	73.4
Massachusetts	[2]5,616	---	---	---	---	---	---	---	---
Michigan	5,175	4,777	398	7.7	3,843	162	1,036	134	74.3
Minnesota	2,126	1,946	180	8.5	1,735	167	155	69	81.6
Mississippi	1,037	971	66	6.4	682	84	134	137	65.8
Missouri	2,609	2,447	162	6.2	2,264	6	260	79	86.8
Montana	397	365	32	8.1	316	20	13	48	79.6
Nebraska	1,007	900	107	10.6	---	---	---	---	---
Nevada	316	303	13	4.1	---	---	---	---	---
New Hampshire	361	---	---	---	231	50	40	40	64.0
New Jersey	4,198	---	---	---	---	---	---	---	---
New Mexico	566	516	50	8.8	---	---	---	---	---
New York	13,723	13,059	664	4.8	---	---	---	---	---
North Carolina	1,876	1,736	140	7.5	1,480	118	156	122	78.9
North Dakota	340	317	23	6.8	239	80	20	1	70.3
Ohio	6,474	5,918	556	8.6	4,892	563	780	239	75.6
Oklahoma	1,972	1,834	138	7.0	1,366	109	219	278	69.3
Oregon	1,509	1,310	199	13.2	1,129	183	127	70	74.8
Pennsylvania	[2]8,216	---	---	---	---	---	---	---	---
Puerto Rico	[2]918	---	---	---	812	70	30	6	88.4
Rhode Island	717	569	148	20.6	---	---	---	---	---
South Carolina	1,250	1,183	67	5.4	916	9	241	84	73.3
South Dakota	[2]480	---	---	---	---	---	---	---	---
Tennessee	[2]2,388	2,173	215	9.0	---	---	---	---	---
Texas	5,783	5,251	532	9.2	---	---	---	---	---
Utah	[2]601	560	41	6.8	476	27	38	60	79.2
Vermont	201	196	5	2.5	94	23	14	70	46.8
Virginia	1,783	1,635	148	8.3	1,338	195	135	115	75.0
Virgin Islands	[2]21	14	7	33.3	17	1	-	3	81.0
Washington	2,285	1,891	394	17.2	1,832	222	192	39	80.2
West Virginia	[2]706	---	---	---	---	---	---	---	---
Wisconsin	2,257	2,079	178	7.9	---	---	---	---	---
Wyoming	277	186	91	32.9	159	1	5	112	57.4

[1]Data not available on sex of 32,897 pharmacists or an education of 66,020 pharmacists.

[2]Includes some pharmacists not in practice.

Table 14. Age distribution of resident pharmacists engaged in practice: January 1, 1967

Location	Resident pharmacists in practice	Number by age						Percent	
		Under 30 years	30-39 years	40-49 years	50-59 years	60-64 years	65 years and over	Under 30 years	65 years and over
Total	[1]122,421	16,386	20,782	16,817	17,163	8,061	7,286	[3]18.9	[3]8.4
Alabama	1,613	298	499	318	170	135	193	18.5	12.0
Alaska	[2]86	---	---	---	---	---	---	---	---
Arizona	992	67	224	252	240	124	85	6.8	8.6
Arkansas	946	142	247	172	114	116	155	15.0	16.4
California	10,720	2,585	2,200	2,450	2,085	900	500	24.1	4.7
Colorado	1,616	137	351	370	448	156	154	8.5	9.5
Connecticut	2,498	---	---	---	---	---	---	---	---
Delaware	234	---	---	---	---	---	---	---	---
District of Columbia	862	---	---	---	---	---	---	---	---
Florida	4,697	---	---	---	---	---	---	---	---
Georgia	2,405	---	---	---	---	---	---	---	---
Hawaii	200	---	---	---	---	---	---	---	---
Idaho	450	60	174	125	48	28	15	13.3	3.3
Illinois	5,889	---	---	---	---	---	---	---	---
Indiana	2,978	539	755	682	483	263	256	18.1	8.6
Iowa	1,621	298	365	306	301	150	201	18.4	12.4
Kansas	1,326	149	291	248	253	167	218	11.2	16.4
Kentucky	1,560	---	---	---	---	---	---	---	---
Louisiana	2,000	660	400	415	340	135	50	33.0	2.5
Maine	434	47	80	50	103	95	59	10.8	13.6
Maryland	2,109	419	661	446	437	87	59	19.9	2.8
Massachusetts	5,616	---	---	---	---	---	---	---	---
Michigan	5,175	990	1,329	1,038	1,052	363	403	19.1	7.8
Minnesota	2,126	350	543	400	385	200	248	16.5	11.7
Mississippi	1,037	244	274	197	163	96	63	23.5	6.1
Missouri	2,609	304	449	403	597	377	479	11.6	18.4
Montana	397	38	108	108	79	28	36	9.6	9.1
Nebraska	1,007	284	210	112	168	86	147	28.2	14.6
Nevada	316	---	---	---	---	---	---	---	---
New Hampshire	361	40	193	96	12	20	-	11.1	---
New Jersey	4,198	945	1,083	768	718	395	289	22.5	6.9
New Mexico	566	---	---	---	---	---	---	---	---
New York	13,723	1,921	2,806	2,034	4,002	1,715	1,245	14.0	9.1
North Carolina	1,876	286	549	498	234	101	208	15.2	11.1
North Dakota	340	96	109	64	44	12	15	28.2	4.4
Ohio	6,474	1,842	1,502	1,163	1,344	325	298	28.4	4.6
Oklahoma	1,972	543	439	321	395	196	78	27.5	4.0
Oregon	1,509	158	392	383	293	145	138	10.5	9.1
Pennsylvania	8,216	---	---	---	---	---	---	---	---
Puerto Rico	918	200	300	220	93	30	75	21.8	8.2
Rhode Island	717	---	---	---	---	---	---	---	---
South Carolina	1,250	248	335	332	177	80	78	19.8	6.2
South Dakota	480	---	---	---	---	---	---	---	---
Tennessee	2,388	486	661	442	355	298	146	20.4	6.1
Texas	5,783	1,082	1,538	1,057	914	602	590	18.7	10.2
Utah	601	---	---	---	---	---	---	---	---
Vermont	201	25	45	37	39	21	34	12.4	16.9
Virginia	1,783	293	509	408	270	117	186	16.4	10.4
Virgin Islands	21	1	8	8	2	2	-	4.8	---
Washington[4]	2,285	364	592	530	333	213	253	15.9	11.1
West Virginia	706	---	---	---	---	---	---	---	---
Wisconsin	2,257	245	561	364	472	283	332	10.8	14.7
Wyoming	277	---	---	---	---	---	---	---	---

[1]Data not available on age of 35,926 pharmacists.

[2]Includes some pharmacists not in practice.

[3]Adjusted for "Age not reported" in reporting States.

[4]Data on age not reported for 92 respondents.

Table 15. Type of practice of resident pharmacis. in practice: January 1, 1967

Location	Resident pharmacists in practice	Number by type of practice						Percent in community pharmacies	
		Community pharmacy			Hospital pharmacy	Manufacturing and wholesale	Teaching, government, and other	Total	Who are employees
		Total	Owner or partner	Employee					
Total	[1]122,421	[2]97,988	38,407	45,395	6,734	4,496	4,281	85.6	54.2
Alabama	1,613	1,344	639	705	128	90	51	83.3	52.5
Alaska	86	80	40	40	1	5	-	93.0	50.0
Arizona	992	824	244	580	95	29	44	83.1	70.4
Arkansas	946	855	456	399	65	13	13	90.4	46.7
California	10,720	9,510	5,484	4,026	699	341	170	88.7	42.3
Colorado	1,616	1,396	---	---	112	67	41	86.4	---
Connecticut	2,498	1,948	957	991	136	124	290	78.0	50.9
Delaware	234	206	92	114	13	10	5	88.0	55.3
District of Columbia	862	682	137	545	68	14	98	79.1	79.9
Florida	4,697	4,204	---	---	117	240	136	89.5	---
Georgia	2,405	1,895	996	899	125	235	150	78.8	47.4
Hawaii	200	177	---	---	9	7	7	88.5	---
Idaho	450	414	211	203	18	13	5	92.0	49.0
Illinois	5,889	4,852	2,138	2,714	613	272	152	82.4	55.9
Indiana	2,978	2,468	996	1,472	198	240	72	82.9	59.6
Iowa	1,621	1,375	757	618	106	112	28	84.8	44.9
Kansas	1,326	1,173	596	577	85	45	23	88.5	49.2
Kentucky	1,560	1,431	---	---	84	30	15	91.7	---
Louisiana	2,000	1,830	1,083	747	82	60	28	91.5	40.8
Maine	434	417	153	264	11	6	-	96.1	63.3
Maryland	2,109	1,922	415	1,507	74	80	33	91.1	78.4
Massachusetts	5,616	5,616	1,872	3,744	---	---	---	---	---
Michigan	5,175	4,475	2,135	2,340	545	110	45	86.5	52.3
Minnesota	2,126	1,651	927	724	150	81	244	77.7	43.8
Mississippi	1,037	934	568	366	54	32	17	90.1	39.2
Missouri	2,609	2,205	961	1,244	225	160	19	84.5	56.4
Montana	397	354	219	135	26	9	8	89.2	38.1
Nebraska	1,007	843	445	398	55	47	62	83.7	47.2
Nevada	316	290	95	195	20	1	5	91.8	67.2
New Hampshire	361	211	150	61	40	65	45	58.4	28.9
New Jersey	4,198	3,721	---	---	85	239	153	88.6	---
New Mexico	566	483	303	180	30	26	27	85.3	37.3
New York	13,723	10,983	3,738	7,245	876	931	933	80.0	66.0
North Carolina	1,876	1,732	849	883	100	31	13	92.3	51.0
North Dakota	340	304	161	143	21	9	6	89.4	47.0
Ohio	6,474	5,735	2,700	3,035	333	214	192	88.6	52.9
Oklahoma	1,972	1,810	760	1,050	58	53	51	91.8	58.0
Oregon	1,509	1,330	493	837	89	32	58	88.1	62.9
Pennsylvania	8,216	---	---	---	---	---	---	---	---
Puerto Rico	918	750	350	400	15	10	143	81.7	53.3
Rhode Island	717	622	257	365	37	33	25	86.8	58.7
South Carolina	1,250	1,132	514	618	51	28	39	90.6	54.6
South Dakota	480	429	---	---	23	17	11	89.4	---
Tennessee	2,388	2,109	---	---	124	91	64	88.3	---
Texas	5,783	5,105	3,040	2,065	334	42	302	88.3	40.5
Utah	601	531	---	---	31	23	16	88.4	---
Vermont	201	188	---	---	9	4	-	93.5	---
Virginia	1,783	1,398	636	762	115	38	232	78.4	54.5
Virgin Islands	21	16	5	11	4	-	1	76.2	68.8
Washington	2,285	1,817	767	1,050	228	67	173	79.5	57.8
West Virginia	706	---	---	---	---	---	---	---	---
Wisconsin	2,257	1,946	951	995	211	67	33	86.2	51.1
Wyoming	277	265	117	148	6	3	3	95.7	55.8

[1]Data not available on type of practice of 8,922 pharmacists.

[2]Data not available on nature of employment of 14,186 retail pharmacists.

Table 16. Pharmacists in community pharmacies and in hospital pharmacies, by size of staff: January 1, 1967

Location	Community pharmacies							Hospital pharmacies	
	Total pharmacists	Number of outlets				Percent of pharmacists in 1-person outlets	Percent of outlets with 1 pharmacist	Total pharmacists	Total pharmacies
		Total	1 pharmacist	2 or 3 pharmacists	4 or more pharmacists				
Total----------	97,988	44,941	11,725	14,273	1,901	[1]21.8	[2]42.0	7,461	[3]2,836
Alabama----------	1,344	995	---	---	---	---	---	128	32
Alaska----------	80	39	---	---	---	---	---	1	1
Arizona----------	824	418	180	204	34	21.8	43.1	95	69
Arkansas----------	855	555	333	207	15	38.9	60.0	65	20
California----------	9,510	4,348	1,800	1,831	717	18.9	41.4	699	289
Colorado----------	1,396	642	---	---	---	---	---	112	33
Connecticut----------	1,948	891	256	538	97	13.1	28.7	136	---
Delaware----------	206	122	---	---	---	---	---	13	9
District of Columbia--	682	240	---	---	---	---	---	68	16
Florida----------	4,204	---	---	---	---	---	---	117	---
Georgia----------	1,895	1,181	602	556	23	31.8	51.0	125	57
Hawaii----------	177	77	---	---	---	---	---	9	19
Idaho----------	414	228	86	142	---	20.8	37.7	18	15
Illinois----------	4,852	2,608	---	---	---	---	---	613	299
Indiana----------	2,468	1,262	395	827	40	16.0	31.3	198	104
Iowa----------	1,375	760	340	386	34	24.7	44.7	106	---
Kansas----------	1,173	661	360	289	12	30.7	54.5	85	21
Kentucky----------	1,431	764	---	---	---	---	---	811	49
Louisiana----------	1,830	1,014	500	380	134	27.3	49.3	82	60
Maine----------	417	247	125	115	7	30.0	50.6	11	1
Maryland----------	1,922	788	15	751	22	0.8	1.9	74	31
Massachusetts---------	5,616	1,872	---	---	---	---	---	---	---
Michigan----------	4,475	2,108	---	---	---	---	---	545	312
Minnesota----------	1,651	910	355	518	37	21.5	39.0	150	61
Mississippi----------	934	619	360	251	8	38.5	58.2	54	29
Missouri----------	2,205	1,245	556	608	81	25.2	44.6	225	120
Montana----------	354	237	137	99	1	38.7	57.8	26	15
Nebraska----------	843	496	246	237	13	29.2	49.6	55	28
Nevada----------	290	138	40	86	12	13.8	29.0	20	7
New Hampshire---------	211	147	31	101	15	14.7	21.1	40	15
New Jersey----------	3,721	1,857	---	---	---	---	---	85	78
New Mexico----------	483	265	139	120	6	28.8	52.4	30	15
New York----------	10,983	---	---	---	---	---	---	876	---
North Carolina--------	1,732	1,035	560	465	10	32.3	54.1	100	71
North Dakota----------	304	186	104	75	7	34.2	55.9	21	14
Ohio----------	5,735	2,739	699	1,720	320	12.2	25.5	333	194
Oklahoma----------	1,810	824	196	582	46	10.8	23.8	58	29
Oregon----------	1,330	567	---	---	---	---	---	89	40
Pennsylvania----------	---	3,290	---	---	---	---	---	---	216
Puerto Rico----------	750	706	666	40	---	88.8	94.3	15	15
Rhode Island----------	622	273	---	---	---	---	---	37	16
South Carolina--------	1,132	604	204	379	21	18.0	33.8	51	23
South Dakota----------	429	227	---	---	---	---	---	23	10
Tennessee----------	2,109	1,085	---	---	---	---	---	124	35
Texas----------	5,105	2,876	1,286	1,456	134	25.2	44.7	334	169
Utah----------	531	276	---	---	---	---	---	31	18
Vermont----------	188	105	80	24	1	42.6	76.2	9	---
Virginia----------	1,398	854	397	445	12	28.4	46.5	115	93
Virgin Islands--------	16	11	6	4	1	37.5	54.5	4	2
Washington----------	1,817	---	---	---	---	---	---	228	---
West Virginia---------	---	372	180	179	13	---	48.4	---	---
Wisconsin----------	1,946	1,059	453	578	28	23.3	42.8	211	85
Wyoming----------	265	118	38	80	---	14.3	32.2	6	1

[1]Based on 53,775 pharmacists.

[2]Based on 27,899 total outlets in 33 locations.

[3]Probably understated. AHA hospital statistics indicate about 4,500 pharmacies with registered pharmacists.

MANPOWER IN HOSPITALS AND NURSING HOMES

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Hospitals are a major component of the health services industry, one of the largest and fastest growing industries in the United States. Based on data from the decennial censuses of population and from annual statistics published by the American Hospital Association, hospital personnel account for two-thirds of all workers employed in the total health services industry. In 1966, more than 2 million people were working in the Nation's hospitals (table 17).

The tremendous increase in hospital personnel over the past two decades may be illustrated with the following statistics from the *Guide* issue of *Hospitals,* the Journal of the American Hospital Association (AHA). In 1947, there were 882,600 employees in hospitals registered by the AHA; this represents an average work force of 143 per hospital or 63 employees per 100 hospital beds. In 1966, employment in registered hospitals had increased to the equivalent[h] of 2,039,300 persons, the average work force to 285 per hospital, and the average number of employees to 121 per 100 hospital beds.

In the 1940's, hospitals had approximately one professional nurse for every 15 beds and one practical nurse, aide, or attendant for every 10 beds. Twenty years later there was one professional nurse for every 5 beds and one auxiliary person for every 3 beds. In addition to nursing personnel, hospitals have been increasing the number of personnel in other occupational categories at a rate that exceeds the growth rates in both hospital beds and total annual admissions to short-term general hospitals.

Quite obviously this growth pattern is related to the community's expanding use of a greater number of hospital services. Many social, economic, and technological factors affect demands for health services. Population growth and change in age composition are significant. The 15 years from 1965 to 1980 are expected to bring about a net increase of 50 million in the Nation's population, including 5 million more people over 65 years of age and 2 million more babies in the year 1980. Increased demands for health services could result in the employment of 1 million more workers in the coming decade.

Despite the magnitude of the hospital work force, surveys have indicated that the present number is not adequate to provide optimum care to the 171 million annual hospital cases (29 million inpatient admissions and 142 outpatient visits). There is a great deal of talk about health manpower shortages—a term that means many things to many people. One concept is the difference between the supply and the number needed to meet a minimum standard established by a profession. Professional groups as well as the public speak about urgent needs for more physicians, dentists, nurses, medical record librar-

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[h]The American Hospital Association reports personnel data in full-time equivalents. To calculate this statistic, two part-time employees are equated with one full-time employee. The resulting figure does not represent, therefore, the actual number of both full-time and part-time people employed; it represents their equivalent in full-time employees.

ians, medical technologists, occupational therapists, physical therapists, and so on through the range of health occupations.

The hospitals also are showing increasing concern about these matters. For quantification of this concern, the American Hospital Association and the Public Health Service Bureau of Health Manpower in 1966 conducted a joint study of staffing and staffing needs of hospitals. At the same time, the Division of Nursing of that Bureau undertook a parallel study of nursing homes and hospitals not registered by the American Hospital Association.

In these studies, each hospital or institution reported by occupation on its present staffing, budgeted vacancies, and the estimated additional personnel needed on the basis of current services and patient load to provide "optimum" care for their present load. To provide such care, hospitals reported a need for 257,200 professional and technical workers in addition to the 1,332,100 employed. This represents an average increase of 19 percent (table 18). In general, the needs for professional workers are proportionately higher than for technical workers. In the parallel study, nursing homes and other extended care facilities reported the need to increase their present staffing total by about 12 percent (table 19). In view of the serious shortage of nursing home beds, these figures probably understate the problem.

SURVEY FINDINGS

In the spring of 1966, 1.3 million professional and technical persons were working in the registered hospitals in the United States, 17 percent of them as part-time workers. The universe of the hospital study was the 7,000 hospitals registered by the AHA. The returns from 5,300 hospitals have been used to estimate data for that total.

More than 1 million employees were in nursing services—three-fourths of the total work force. The largest single group was that of nursing aides, orderlies, and attendants—492,000. Registered nurses made up the next largest group—361,000. Licensed practical nurses numbered 150,600.

Among nonnursing personnel, the largest groups were medical technologists, 54,500, and radiologic technologists, 24,000. Other categories with more than 10,000 workers were surgical technicians, 17,600; laboratory assistants, 14,600; dietitians, 12,700; social workers, 10,700; and medical record technicians, 10,100.

Of the 1.3 million professional and technical workers in registered hospitals, about 118,000 were employed in Federal hospitals, 213,000 in State and local governmental short-term general and special hospitals, 746,000 in nongovernmental (voluntary and proprietary) short-term general and special hospitals, 106,000 in long-term general and special hospitals, and 150,000 in psychiatric hospitals. The ratio of workers to every 100 patients varied from 32 in psychiatric hospitals to 173 in nongovernmental short-term general and special hospitals.

More than 130,000 budgeted positions for professional and technical personnel in registered hospitals were vacant in the spring of 1966. This represented a vacancy rate of almost 9 percent. The highest number of vacancies was for registered nurses—46,500. Among nonnursing personnel, the greatest number of budgeted vacancies was for medical technologists—4,600.

The hospitals reported a need for 257,200 professional and technical personnel to provide optimum care to the present patient load. This number represents a 19-percent increase in personnel presently employed While the 79,500 needed registered nurses represented the greatest numerical shortage, the required proportional increase of 22 percent was not the largest in terms of either nursing service personnel or all hospital professional and technical personnel. A 27-percent increase in licensed practical nurses represented the greatest proportional need in nursing service, and a 39-percent increase in therapeutic service personnel represented the greatest proportional need in the hospital. Within the therapeutic services, hospitals reported a need for 56 percent more occupational therapists, 48 percent more social workers, 47 percent more speech pathologists and audiologists, and 42 percent more recreation therapists.

In response to the query of its five most urgent perceived needs, hospitals gave the first three priorities to registered nurses, nursing aides, and practical nurses, in that order. The relative needs, however, are greatest in the newer fields, reflecting the broadening role of the hospital in providing more comprehensive services. Need for at least double the present number of occupational therapists and social workers was perceived. Inhalation therapists, physical therapists, recreation therapists, and speech pathologists are other groups for which relatively large increases are urgent.

With regard to nursing homes, the material for these institutions is not yet completely processed. Based on preliminary returns for a small sample, the most important characteristic shown by the study is that 2 out of 3 workers in these institutions are aides, orderlies, or attendants. However, two-thirds of the need is in other categories. Following the aide group, numerically the most important needs were for licensed practical nurses, registered nurses, physical therapists, dietitians, recreation therapists, and occupational therapists, in that order.

Despite variations in numbers and proportions of personnel needed, the survey data indicate an overall insufficiency in professional and technical personnel to meet present patient load demands. Future growth appears to hold little promise for narrowing the gap between the need for personnel and the personnel available, at least under present educational outputs and use of personnel.

DISCUSSION

The Survey of Manpower Resources measured at one point in time the distribution of the hospital work force among about 30 categories of hospital employees. At the same point in time, data were also obtained on use of selected hospital services. The merging of these data permits description of the availability of personnel by skill levels in hospitals classified by control, service, bed size, and geographic location.

The description that can be accomplished by the use of the survey data is recognized to be superficial in terms of the knowledge that is needed for effective development and utilization of personnel. As an example, the survey gives no insights into the services provided in relation to the clinical characteristics of the hospital or the demands for such services not currently being met. The survey provides a brief description of the number of personnel used and should not be confused with a study of the use of hospital personnel.

In addition to counts of presently employed personnel, the survey also obtained data on the number of vacant but budgeted positions, the number of workers required to provide present optimum care, and the number required to provide optimum care a year from the date of the survey. These data provide some insight into shortages, but they must be used with caution. The budgeted vacancies may represent desired rather than critical personnel. The data responses concerning present and future optimum needs are opinion responses. Further, they are opinion that was given just prior to the implementation of Public Law 89-97 when the demands for hospital service created by the law were conjecture, rather than fact. There is nothing wrong with opinion data as long as they are used as such and are not interpreted as factual measurements.

While there are limitations to the use of the survey data, there are descriptive analyses of the data that have yet to be done. As examples, the use pattern of full-time versus part-time employees has not been fully explored; the need for and availability of certified versus noncertified technicians still must be analyzed. In brief, while there are descriptive interpretations of the Manpower Survey that should only be done with extreme caution, there are other quite logical descriptive uses of the data that have been untapped to date.

Interpretations that misuse the data are beginning to appear. For example, there have been attempts to construct staff ratios. Information on hospital services and on important variables of the individual hospitals (e.g., physical plant design) are critical to the construction of staffing ratios. Furthermore, such ratios should only be used as guidelines for staffing, not as mandatory levels.

Misuse of the manpower data stems, by-in-large, from viewing the data as an end in itself. The survey is only the beginning of our knowledge concerning the use of hospital manpower. This study describes the supply; we must now begin research into how to use the supply. This "yet to be done" research must:

(1) Focus on the total institutional use of manpower. Studies limited to manpower in the hospital segment block understanding of the supplementary relationships that exist among the work forces of the various components.

(2) Use research techniques other than mailed questionnaires. This technique is inappropriate to much of the information now needed concerning hospital manpower. Future studies in the hospital setting should draw upon research tools, such as those developed by industrial engineering.

(3) Develop methods of more intensive studies of smaller samples of hospitals, demonstrate the use of techniques appropriate for such studies, and educate people as to the need for information on manpower functions and capabilities.

In summary, the 1966 survey of hospital manpower resources indicated present and future shortages of hospital manpower. Our study efforts do not stop with the survey; this is only a beginning step. Research efforts must be directed toward understanding present patterns of use, the design of more effective patterns of use for a limited supply of personnel, and the development of more effective educational programs.

Table 17. Personnel employed in the health services industry: 1940-75

Year	Workers in health services industry		
	Total	Hospitals	Other
1975	[1]5,350,000	3,375,000	1,975,000
1966	[1]3,672,000	2,363,000	1,309,000
0	,642,300	1,726,600	915,700
1950	1,698,900	1,009,000	689,900
1940	1,059,000	---	---

[1] Estimated by Bureau of Labor Statistics.

Sources: U.S. Bureau of the Census: Comparative Occupation Statistics for the United States, 1870 to 1940. Washington, U.S. Government Printing Office, 1943.

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U.S. Department of Labor, Bureau of Labor Statistics: Health Manpower 1966-75. A Study of Requirements and Supply. Report No. 323, Washington, U. S. Government Printing Office, 1967.

Table 18. Personnel employed in hospitals: 1966

Category of personnel	Present staff[1]	Additional needed to give optimum care	Percent additional
Total professional and technical	1,332,100	257,200	19
Nursing service:			
Nurse—R.N.	361,000	79,500	22
Licensed practical nurse	150,600	41,400	27
Surgical technician	17,500	3,900	22
Aide, orderly (except in psychiatric hospitals)	374,400	51,300	14
Aide, orderly in psychiatric hospitals	117,600	18,500	16
Diagnostic services:			
Medical technologist	54,500	9,200	17
Laboratory assistant	14,600	2,500	17
Cytotechnologist	1,600	500	31
Histologic technician	3,900	700	18
Electrocardiograph technician	5,900	800	14
Therapeutic services:			
Occupational therapist	4,100	2,300	56
Occupational therapy assistant	3,800	1,200	32
Physical therapist	8,500	2,900	34
Physical therapy assistant	5,200	1,100	21
Social worker	10,700	5,100	48
Social work assistant	1,500	500	33
Recreation therapist	3,800	1,600	42
Inhalation therapist	5,600	2,200	39
Speech pathologist and audiologist	1,200	500	42
Radiology:			
Radiologic technologist	24,000	3,900	16
X-ray assistant	6,000	900	15
Pharmacy:			
Pharmacist	9,400	1,900	20
Pharmacy assistant	5,600	900	16
Medical records:			
Medical record librarian	6,300	1,800	29
Medical record technician	10,100	1,800	18
Dietetics:			
Dietitian	12,700	3,500	28
Food service manager	5,400	800	15
All other professional and technical	106,500	16,000	15

[1]Survey week of April 17-23, 1966. Returns from 5,300 hospitals have been used to estimate data for the total of 7,000 hospitals.

Sources: U.S. Department of Health, Education, and Welfare, Bureau of Health Manpower: Health Manpower Perspective: 1967. PHS Pub. No. 1667. Public Health Service. Washington, U.S. Government Printing Office, 1968.

Manpower Resources in Hospitals—1966. Chicago, American Hospital Association, 1967.

Table 19. Personnel employed in nursing homes: 1966

Category of personnel	Present staff[1]	Additional needed to give optimum care	Percent additional
Total professional and technical	275,000	31,900	12
Nursing service:			
Nurse—R.N	31,000	6,000	19
Licensed practical nurse	33,600	9,400	28
Aide, orderly, attendant	177,400	10,700	6
Therapeutic services:			
Occupational therapist	1,600	800	50
Occupational therapy assistant	1,300	300	23
Physical therapist	2,000	1,200	60
Physical therapy assistant	900	300	33
Social worker	1,200	500	42
Recreation therapist	2,600	900	35
Speech pathologist and audiologist	300	400	
Medical records:			
Medical record librarian	300	100	33
Medical record technician	800	100	12
Dietetics:			
Dietitian	4,600	900	20
All other professional and technical	17,400	300	2

[1]Estimates for all known extended care facilities based on 499 returns in Public Health Service Survey.

Source: U.S. Department of Health, Education, and Welfare, Bureau of Health Manpower: Health Manpower Perspective: 1967. PHS Pub. No. 1667. Public Health Service. Washington, U.S. Government Printing Office, 1968.

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